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BOTANIC
Kew. ROYAL GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

ADDITIONAL SERIES I.

REPORT

ON THE

ECONOMIC RESOURCES OF THE WEST INDIES,

BY

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Mo. Bot. Garden,

PREFACE.

THE West Indies possess a large extent of fertile soil, as well as a varied and favoured climate. No part of the earth's surface seems destined by Nature for a happier prosperity. That condition is, unhappily, not realized. Their condition is far from flourishing: occupying an area nearly as large as that of the British Isles, little more than two per cent. of it is cultivated at all, and only seven per cent. of that which admits of cultivation. Yet they are capable of producing every kind of tropical produce, and in the temperate countries of the New World possess a ready and ample market. For at least a hundred years past no effort has been wanting on the part of the Home Government to supply them with plants from all parts of the world, which would form the foundation of culture industries.

To examine the cause of their present distress, Her Majesty the Queen was pleased in December 1896 to appoint a Commission of Enquiry, composed of men of exceptional ability and experience. With the assent of the Lords of the Treasury, and of the First Commissioner of Her Majesty's Works and Public Buildings, the Assistant Director of the Royal Gardens, Kew, was attached to the Commission as "Expert Adviser in Botanical and Agricultural Questions." The Commission proceeded to the West Indies in January of last year, and issued its report in the following autumn.

To this report the document reprinted in the present volume was added as an appendix. It was drawn up by the Assistant Director for the use of the Commission. Dr. Morris's residence in the West Indies, his repeated visits to them, and his intimate knowledge of their conditions have enabled him to produce an account as accurate as it is impartial of their natural and economic resources, which is certainly more complete than anything hitherto available. Why the West Indian Colonies have failed to reach success, and in what direction the path to it lies in the future, can be readily understood by anyone who will take the trouble to read these pages.

At the conclusion of their report, the Commissioners bear testimony to the value of this document in the following terms :—

"We have had in the course of this report to refer frequently to the very interesting and valuable survey supplied by Dr. Morris of the agricultural resources and requirements of the Colonies visited by us, which forms Appendix A in this volume. Dr. Morris's presence with the Commission has been of great advantage to us; no adviser could have been assigned better qualified, both by general and local knowledge, to assist and inform us in regard to botanical and agricultural questions. The report which he has prepared bears witness to the closeness of his study of these questions, and the assiduity with which he has collaborated throughout the course of our inquiry to further the purposes of the Commission."

The Secretary of State for the Colonies having desired that this Appendix should be issued in a more accessible and convenient form, it was eventually decided that this should be done in connection with the *Kew Bulletin*, the pages of which contain a large mass of information cognate with the subjects enquired into by the Commission.

The opportunity has been taken to carefully revise it. Under each colony a full account has been added within brackets of its botanical organization, as well as lists of books and papers, which may be consulted for further information.

W. T. T. D.

Kew, January 1898.

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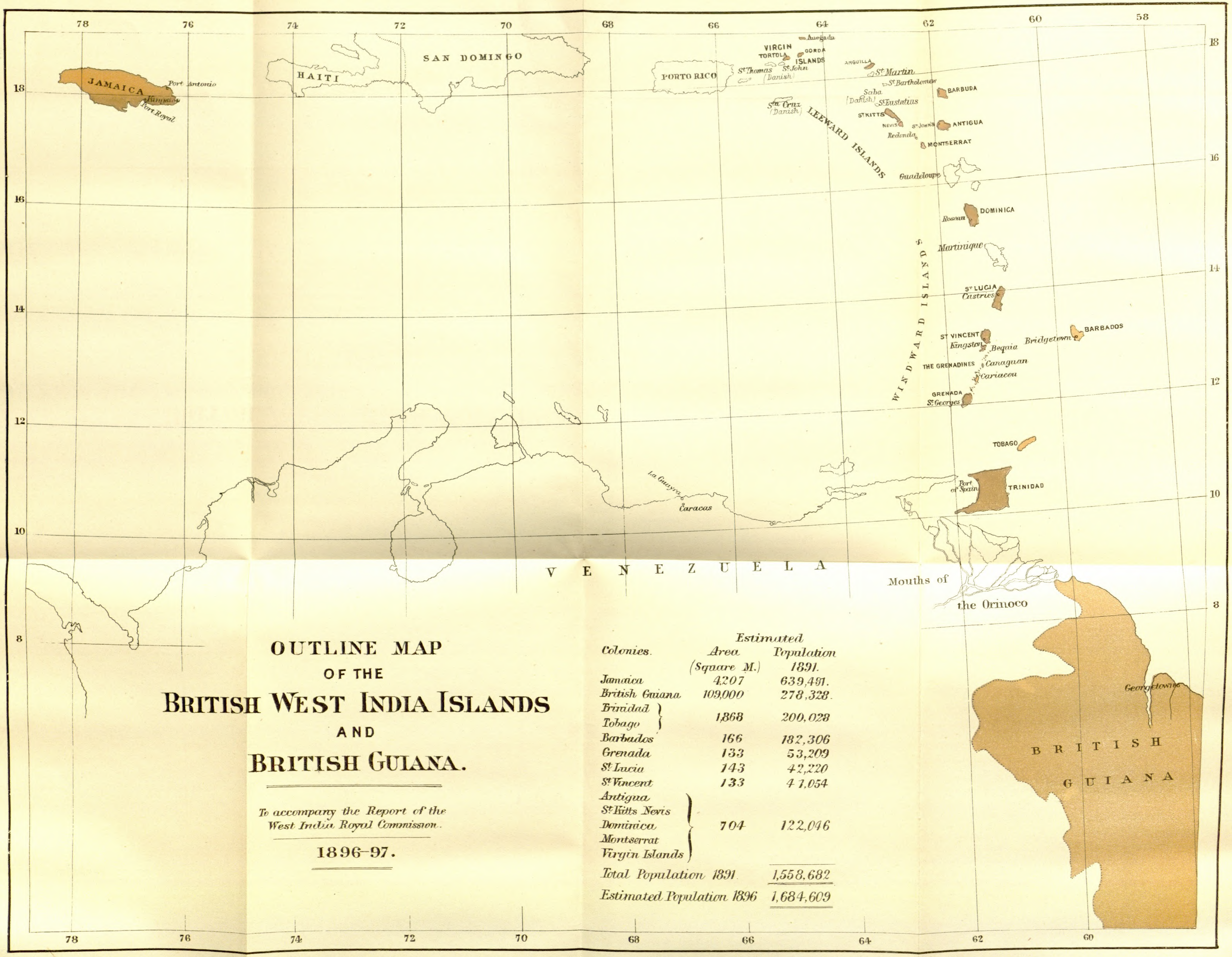

OUTLINE MAP OF THE BRITISH WEST INDIA ISLANDS AND BRITISH GUIANA.

To accompany the Report of the West India Royal Commission.

1896–97.

Colonies.	Estimated Area (Square M.)	Estimated Population 1891.
Jamaica	4,207	639,491.
British Guiana	109,000	278,328.
Trinidad, Tobago	1,868	200,028
Barbados	166	182,306
Grenada	133	53,209
St Lucia	143	42,220
St Vincent	133	41,054
Antigua, St Kitts Nevis, Dominica, Montserrat, Virgin Islands	704	122,046
Total Population 1891		1,558,682
Estimated Population 1896		1,684,609

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BULLETIN

OF

MISCELLANEOUS INFORMATION.

ADDITIONAL SERIES I.

A REPORT ON THE AGRICULTURAL RESOURCES AND REQUIREMENTS OF BRITISH GUIANA AND THE WEST INDIA ISLANDS.

The Colonies dealt with in this report include all Her Majesty's possessions existing within the tropical area usually designated as the West Indies, with the exception of British Honduras, on the mainland of Central America, and the numerous scattered islets to the west of Cuba and Florida, forming a group apart, known as the Bahamas. In neither of these is sugar produced in any quantity.

2. Excluding British Honduras and the Bahamas, there are six Colonies which possess a separate Government. Beginning from the south, they are as follows: (1) British Guiana, (2) Trinidad and Tobago, (3) the Windward Islands, (4) Barbados, (5) the Leeward Islands, and (6) Jamaica. The Windward Islands consist of the Islands of Grenada, St. Vincent, and St. Lucia; while the Leeward Islands, in the same chain to the north, are composed of Dominica, Montserrat, Antigua, St. Kitts-Nevis, and the Virgin Islands.

3. The relative size and importance of these Colonies may be illustrated by the following table, in which the area, population, and trade of each are given from recent returns :—

—	Area.	Population.	No. of Persons per Square Mile.	Revenue.	Total Imports, 1896.	Exports of Products of Colony, 1896.	Total Imports and Exports.
	Square Miles.			£	£	£	£
British Guiana ..	109,000	278,328	2·5	567,749	1,443,553	1,814,000	3,257,553
Trinidad and Tobago	1,868	248,353	132·9	628,332	2,056,872	1,373,000	3,429,872
Windward Islands ..	506	146,061	288·6	132,491*	415,990*	324,000	739,990
Barbados	166	186,000	1,120·4	146,315	1,048,886	577,000	1,625,886
Leeward Islands ..	704	131,000	186·0	119,082*	364,075*	304,000	668,075
Jamaica	4,207	694,865	165·1	129,602	2,288,946	1,700,000†	4,288,962
Total ..	116,451	1,684,607	14·4	1,723,571	7,618,322‡	6,092,000†	14,010,338

* For 1895 only. † Approximate. ‡ Includes about £1,200,000 of goods re-exported.

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4. The total area is only slightly less that that of the British Isles; the population is about that of Wales, while the annual trade is of the total value of nearly 14,000,000*l.* sterling. More than 50 per cent. of this trade is carried on with the mother country, but of late years, owing to the existence of more favourable markets for sugar and fruit, there has been a tendency to increase the commercial relations with the United States and Canada. There has been a considerable reduction in the trade of all the Colonies of late years, except in Trinidad and Jamaica. This is entirely due to depreciation in the value of sugar, rum, and molasses.

5. The mineral wealth of the West Indies, with the exception of gold in British Guiana and asphalt in Trinidad, is small. In fact they may be described as generally devoid of mineral resources. Their true wealth lies in the products and resources of a rich and fertile soil. These, combined with an advantageous geographical position, a salubrious climate, abundant rains, varying altitudes, and a large and increasing population, suitably developed, should place the Colonies in a much more advantageous position than they occupy at present.

6. They have been hitherto almost purely "sugar" Colonies, and sugar, molasses, and rum may still be regarded as practically the only agricultural productions of British Guiana, St. Vincent, Barbados, Antigua, and St. Kitts-Nevis. The sugar industry in Grenada has entirely given place to cacao; in Trinidad also cacao is a valuable industry, and in some years has equalled that of sugar; in Dominica sugar has almost died out, and other industries, such as limes, cacao, coffee, and fruit, are beginning to take its place. In Jamaica the sugar industry still exists, but is largely overtopped by fruit, dye-woods, coffee, and pimento.

7. The West Indian Colonies, like other similar countries, have suffered from the fact that "the area of production of the staple "products of the tropics has of late years increased so much, and "competition has become so severe, that it is only in localities "presenting exceptional advantages of soil, climate, accessibility, "labour supply, and the like, that the settler can hope for success "proportionate to his labours."

8. Their present condition is far from satisfactory. This is variously attributed to continued low prices, due to over-production, to unpropitious seasons, disease of crops, and, in the case of their staple industry, to protective tariffs in the New World and to the competition of beet-sugar in the Old World. In most of the Colonies the situation is undoubtedly aggravated by their almost entire dependence on one industry. This is a source of grave danger in more ways than one. It is dangerous commercially, for any great depreciation of prices immediately affects the whole community. It is dangerous agriculturally, for adverse seasons or hostile tariffs may plunge at any moment the entire labouring population into great distress. Again, the growth of a single crop lends itself sooner or later to the spread of disease, and it rarely leads, owing to the neglect of other resources, to the production of the largest profit. To these may be added the

narrowing effects produced on those engaged in the industry, and their inability or disinclination when a crisis comes to take up any other industry.

9. A somewhat general opinion exists that the best soils in the West Indies have already been cleared and planted. How far this is borne out by actual facts will appear from the following table :—

—	Area in Acres.	Acres per Unit of Population.	Area now cultivated.	Area of Cultivable Land not Beneficially Occupied.	Value of Exports per Head of Population.	No. of Coolie Immigrants.
			Acres.	Acres.	£ s. d.	
British Guiana	65,836,000	236·54	325,000	20,000,000	6 7 1	105,462
Trinidad and Tobago ..	1,193,313	4·88	310,000	550,000	5 16 11	83,000
Windward Islands ..	328,122	2·24	95,000	135,000	2 4 4	2,660
Barbados	106,470	·57	90,000	10,000	3 2 0	—
Leeward Islands ..	390,840	2·93	100,000	150,000	2 7 0	—
Jamaica	2,692,480	3·87	693,674	1,500,000	2 12 6	14,128
Total . ..	70,547,225	41·87	1,613,674	22,345,000	3 13 8	205,251

Percentage of cultivated area to total area = 2·18.
" " " cultivable area = 7·22.

10. According to returns placed before the Commission, the area now under cultivation is only a little over 2 per cent. of the total area, and only a little over 7 per cent. of the estimated cultivable area. Only about a million and a half acres are now under cultivation, while, after allowing for swamps, rocky and other useless lands, and for forest reservations, there are over twenty million acres of land suitable for bearing crops. In discussing this point in 1883 I said : " This review will show to " what a small extent the rich and fertile lands of the West Indies " have been so far utilised. In British Guiana alone there is an " area of country equal to two Ceylons quite untouched . . . " to Trinidad we could add the wealth of the Straits Settlements, " and with the resources of the unworked soils of Jamaica we " might emulate the prosperity of at least four colonies the size of " Mauritius."*

11. As mentioned by the late Sir Robert Hamilton in regard to Dominica, " there is no royal road to increasing the wealth and " prosperity of these islands." This can only come from an increased production in them of articles for which there is a constant and remunerative demand. The sugar cultivation should be confined to the best lands only, and by the aid of scientific researches and mechanical ingenuity, taking advantage of every economy and of every improvement to produce an article of high quality at the lowest possible cost. This will necessitate in the Colonies hitherto producing only raw or muscovado sugar the erection of suitable factories for the production of high-class sugars on a large scale, and the separation, as far as possible, of the work of cultivation from that of manufacturing the sugar. Careful experiments will also be necessary to obtain by selection

* " Planting Enterprise in the West Indies." Colonial Papers, 1883, p. 147.

the richest and most suitable canes, to determine for each soil the best manures to be applied, while the most recent appliances are introduced to economise labour to the utmost extent.

12. In order to enlist the energies of the black people, who have hitherto refused to work for the wages offered them on the sugar estates it is desirable to extend the system of cane farming, and arrange to pay such prices for the canes as will attract the better class of peasants, and, while maintaining the industry, create a higher standard of comfort amongst those engaged in it. This would more particularly apply to Trinidad, St. Lucia, Jamaica, and, possibly, to Barbados, if central factories are established in the latter. Further, the intellectual activity of all classes requires to be stimulated by suitable education and training, and by being led to regard agricultural pursuits as offering at least equivalent advantages to those of other callings. Improved means of communication are necessary not only between the Colonies themselves but with outside markets, and judicious aid is needed to be given, where suitable conditions exist, for starting other industries.

13. As most of the West Indian Colonies are in a critical condition, their individual circumstances will demand grave consideration. Setting aside any general measures that may be decided upon to assist the purely sugar-producing Colonies, it will be evident from what follows that the Windward and Leeward Islands and Barbados will require special treatment, and in addition any assistance given to them will necessitate a closer supervision and to be applied with as little delay as possible. With their present limited revenue it will be necessary for them to adopt the most rigorous measures of economy to maintain even the elements of administrative government. It will be impossible to devote funds to such institutions as botanic and experimental stations and industrial schools, or make provision for steam communication with each other or with other countries, and yet the neglecting of these agencies will be fatal unless the islands are to be allowed to drift into a condition helplessness.

[As a special feature in the economic development of the West Indies, it is desirable to mention the organisation of what are known as Botanic Stations, or small establishments suited to the requirements of Colonies unable to bear the expense of regular Botanic Departments such as those existing in Jamaica, Trinidad, and British Guiana. These Stations (*Kew Bulletin*, 1896, pp. 226–227) were "first suggested in 1885, to meet the special requirements of the smaller islands in the West Indies (*Kew Bulletin*, 1887, June 1–12) where 'a great want was felt for reliable information on the culture of new economic plants and plain practical hints as to the best means to be employed for rendering them of the greatest value' (p. 7). This information was intended to be supplied by a regular system of bulletins, supplemented by the maintenance of stations, with nurseries attached, for supplying seeds and plants. The officers in charge of the station were men selected mostly from Kew, with a sound knowledge of gardening and capable of showing experimentally the conditions under which tropical economic plants might best be utilised as objects of remunerative industry."

"The scheme met with the approval of the late Earl of Derby, and has been supported by successive Secretaries of State. The details of its working have devolved largely on Kew, which has been continuously drawn upon for men, plants, advice and information.

"The first Botanic Stations were started at Grenada and Barbados in 1886. These were soon followed by similar stations at St. Lucia (1889), Dominica and other islands in the Leeward Group (1889), St. Vincent (1890), and afterwards at British Honduras (1894)."

"The Grenada Station was established on a spot just outside the town of St. George's, and, as shown later, has become an important institution. "An account of the interesting station at St. Vincent, established on the site of the old botanic garden that existed from 1765 to 1823, was given with a drawing of the curator's house in the *Kew Bulletin* (1892, p. 92). Several references are made to the excellent work done at the Botanic Garden at Dominica, which promises to be one of the most attractive and useful in the West Indies (*Kew Bulletin*, 1893, 148)."

It may be added, that the important part taken by the Botanical Department of Jamaica in developing local industries is widely recognised in the West Indies. Its history is almost unique in this respect amongst the botanical institutions of the Colonies. It has contributed largely also to increase botanical knowledge in regard to the flora of the West Indies, and taken a leading part in disseminating sound and practical information respecting the cultivation of plants suitable for this part of the world. A few years ago, in the whole of the West Indies, there were only two botanical institutions. Recently there were eleven. This development is one of the strongest proofs that the islands are recognising the value of systematic botanical organisation for increasing their natural resources, and it affords great encouragement as regards the future.

In 1886 an inquiry was made into the condition of the forest growth in the West Indies by Mr. E. D. M. Hooper, of the Indian Forest Department. The islands visited were Jamaica, Tobago, Grenada, St. Vincent, St. Lucia, and Antigua, together with the Colony of British Honduras.

The reports were almost immediately issued. They were prepared with great care, and it may be hoped will have an appreciable effect upon the treatment and management of the forests still left in the West Indies. Forests, as is well known, are necessary not only as reserves of timber to supply future wants, but also as a means of maintaining due humidity of climate, and protecting the sources of springs and rivers. Mr. Hooper has dealt with the nature, extent. and value of West Indian timber trees, and he has brought together a large amount of useful information respecting the condition of the interior of the islands, and the measures which are best adapted to prevent extensive and reckless cutting down of forests essential to their well-being and future prosperity.

These forest reports have already served in Jamaica as a basis for useful legislation ; but it is hoped that the West Indian

Colonies generally will regard a rational system for the preservation of forests, and for maintaining the humidity and fertility of the land as intimately connected with their very existence as centres of production in everything relating to plant life. Unfortunately, arrangements were not made for including Dominica, Trinidad, and British Guiana in Mr. Hooper's inquiry, and hence no reports were prepared by him on the forests of these Colonies. The treatment of the forests in Trinidad has, however, been dealt with in a report prepared by Mr. J. H. Hart, F.L.S., in 1891. Mr. Hart expresses the opinion "that there exists an urgent and practical need for a general and uniform scheme of forest conservation, reservation, and *reboisement* is fully proved from the answers of the Wardens to my questions on the subject which strongly show the necessity for the interference of the State."

Amongst the works relating to the Botany of the West Indies generally, the most accessible is the "Flora of the British West Indian Islands," by A. H. R. Grisebach (London, 1859–64). This is one of the earliest of the Colonial Floras brought out under the supervision of Sir William Hooker, Director of Kew, 1841–1865. Amongst older and less accessible books are Tussac's "Flora Antillarum" (1808–1827), with 138 coloured plates; Lunan's "Hortus Jamaicensis" (1814); and Descourtilz' "Flore Médicale des Antilles" (1821–1829). A list of other works on the Botany of the West Indies may be found in the "Guide to the Botanical Literature of the British Empire," published in the *Kew Bulletin*, 1889, pp. 153–189. Collections of West Indian plants from the time of Sloane, 1696, to the present day are preserved in the Herbarium at Kew, and in that of the Botanical Department, British Museum Natural History. The economic resources of the West Indies are fully illustrated by specimens in the Museums at Kew. The handbooks, catalogues, and reports published in connection with the Colonial and Indian Exhibition, 1886, contain detailed information respecting the various products of the West Indies. Since then, information respecting the economic resources of our West Indian Possessions, the operation of Botanic Institutions, the fruits available for export, the diseases of cultivated plants and other subjects has been published in the *Kew Bulletin* (London: Eyre and Spottiswoode). Of this ten volumes, with a general index, have been issued to the end of 1896.]

14. At the request of the Chairman, a scheme, the particulars of which are given in the Appendix, has been prepared, indicating the means considered necessary to give immediate assistance to the Colonies concerned, and calculated to place them in such a position as to become ultimately self-sustaining and fairly prosperous. The cost at first will be considerable, but it may prove after all the more economical in the end.

II.—BRITISH GUIANA.

15. The Colony of British Guiana comprises the old Dutch settlements of Demerara, Essequebo, and Berbice, finally ceded to Great Britain in 1815. The total area is estimated at 109,000 square miles. The low coast line is about 300 miles in length and is intersected by a dozen great rivers emptying themselves into the Atlantic Ocean. Their size and the volume of water brought down by them sufficiently indicate that British Guiana is a portion of a large continent. In this respect it differs from all other possessions of Her Majesty dealt with in this report. It is at once the largest and most valuable of the British West Indian Colonies, and its capabilities of development are practically unlimited.

16. The surface of British Guiana may be described as a gentle slope from the frontier of Brazil down to the coast. The mountainous parts are at the back, while the coast lands are low and swampy and are continually being extended by mud brought down by the rivers. What was the old coast line of Guiana is marked by a line of sand-hills about 20 to 30 miles inland. The rich heavy soils of the coast were first drained by the Dutch, who, with characteristic energy, converted what was once a mangrove swamp into a rich and fertile country. This land has since been maintained in cultivation by the English by an elaborate and costly system of canals and pumping engines. Immediately behind the mud flats are swamps of oozy peat called "pegass" with here and there elevated spots along the river bank supporting a forest vegetation. Then come the long stretches of white sand reefs rising to a hundred feet or more. Further back is the primeval forest region, with outcrops of primary and metamorphic rocks forming in the river beds formidable barriers which impede the navigation. Above the rapids the vast extent of forest and savannah lands are practically untraversed except by a few Indians, or here and there by scattered parties of gold-seekers. Along the remote Brazilian frontier are long ranges of picturesque and fantastic mountains, for the most part covered with grass and scrub. More than three-fourths of the Colony are covered with forest. The climate of British Guiana is tropical, but on the whole pleasant and healthy. The temperature is equable and ranges from 76° to 86° Fah. The climate in the interior is said to be cool and agreeable, especially on the open savannahs. On the coast the sea breezes are constant and refreshing. The rainfall is usually very heavy; in some years it may be as much as 130 inches and in others as low as 70 inches. Vegetation seldom suffers from prolonged drought. Unlike the West India Islands, no hurricanes are experienced and floods are seldom injurious to life and property.

17. The settled portion of the Colony extends along the sea coast from the east bank of the Corentyne River to the west bank of the River Essequebo, a distance of 200 miles. Besides this fringe of coast land, there are some islands under cultivation at the mouth of the Essequebo river, while a few sugar estates and some scattered villages and single houses are found on the banks of the river some distance inland.

18. The population according to the census of 1891 was 278,328 (less than three persons to a square mile), and nine-tenths of it are confined to the coast region. The east coast of Demerara is the most thickly populated, next comes the west coast of Demerara and Essequebo, and lastly Berbice. In these settled portions of the Colony are included the principal towns, sugar plantations, cattle farms, and negro villages. There is a single public road running parallel to the coast, and a railway from Georgetown to the eastward. Recently a short railway has been constructed to connect the Demerara river with the Essequebo above the falls. Beyond these all communication in the Colony is by water.

19. In the days of the Dutch occupation and down to 1829 the principal productions of Guiana were sugar, coffee, cacao, and cotton. In 1817 11,000 slaves were employed. In 1829 there existed 230 sugar estates and 174 coffee and cotton estates, nearly all in full cultivation. The total sugar production in 1829 was 46,026 tons; while there were also produced 9,230,486 lbs. of coffee, and 1,596,171 lbs. of cotton. The island of Leguan, in the mouth of the Essequebo, was so fertile and beautiful that for many years it was termed the garden of the Colony; it contained 23 sugar and three coffee and plaintain estates. The island of Wakenaam had 20 sugar estates producing in 1829 crops weighing 9,363,934 lbs. Twenty years later (1849) owing to the abolition of the slave trade, and subsequent emancipation, the number of sugar estates in the Colony was reduced to 180, and the coffee and cotton estates had almost entirely disappeared. From this time the population became gradually concentrated on the coast lands, and sugar became the staple production of the Colony. The sugar crop had increased in 1879 to 95,078 tons, and in 1889 to 115,587 tons. All other exports had practically disappeared.

20. One result of emancipation, viz., the abandonment of estates in the interior, led to the settlement of the negroes in villages on the coast. The freed men combined together and bought old sugar plantations for which in the aggregate they paid nearly half a million dollars. On these they erected cottages, and at the present time negro villages are found along the coast alternately with the sugar estates. The appraised value of these negro villages in 1896 was nearly 1,000,000 dollars, while the population at the census of 1891 had increased to 26,983 souls. This large population is only partially and fitfully employed on the sugar estates. It mainly supports itself by growing plantains and provisions, and engaging for short periods in the gold industry.

21. In 1850 the labouring population consisted of two classes, viz.: creole negroes and immigrants. The latter were African, Portuguese, and coolies. The number of creoles resident on sugar estates was 19,959, non-resident 42,755, of the immigrants, 5,820 were African, 5,206 Portuguese, 8,410 coolies. The total creole population in 1850 was 62,694, and the immigrant population 19,436. Even at that time "out of the 82,000 composing the rural popula-"tion, upwards of 42,000 hardly contributed in any way to raise "the staples of the country."

22. At the last census (1891) the total population of the Colony

was returned at 278.328, made up as follows :—European other than Portuguese 4,558 (or less than two per cent.) ; aborigines 17,463 ; East Indians 105,463 ; Chinese 3,714 ; Portuguese 12,166 ; Africans 3,433 ; blacks, &c., 141,531. Of the total, 180,106 were natives of the Colony. In 1895–96, 3,069 labourers were registered for wood-cutting grants, 1,037 for balata grants, and 17,638 for gold-mining purposes.

Sugar Industry.

23. The total area of British Guiana is officially given as 65,836,000 acres, or about the size of Hungary and not much smaller than Austria. The area beneficially occupied by cultivation is estimated at 352,000 acres or not quite the size of Surrey. The area under sugar-cane is given as 66,908 acres or not quite the area of the county of London. The number of sugar estates now existing is 64, of these 57 have a larger area than 500 acres each. The amount of capital invested in properties now existing is estimated by the Planters' Association at 10,000,000*l*. The portion of the population directly concerned in the sugar industry according to the census of 1891 was 90,492, or about one-third of the total population of the Colony.

24. The export of sugar in 1895–96 was 101,160 tons, of the value of 1,046,160*l*. Not calculating that locally consumed, this gives an average yield of 1·5 tons of sugar and an average value of 15*l*. 6*s*. per acre. The highest export in recent years was in 1887, when it reached 134,876 tons, of the value of 1,778,638*l*. With 76,569 acres under cultivation in that year, this would give an average yield of 1·7 tons of sugar, and an average value of 23*l*. 9*s*. per acre. Hence it will be seen that the return value per acre in sugar has fallen in ten years nearly 40 per cent. According to the evidence tendered before the Commission, it is now so low as to hardly cover the cost of production.

25. Sugar is undoubtedly the staple production of British Guiana. The industry is carried on with considerable energy and intelligence. The maintenance of an elaborate system of drainage, the skilful cultivation of the soil, and the high character of the processes of extraction and manufacture place British Guiana amongst the most progressive of the cane-sugar producing countries of the world. It is estimated that cane-sugar of high quality can be produced almost as cheaply in British Guiana as in most tropical countries. British Guiana is nevertheless handicapped in being compelled to maintain an expensive system of artificial drainage, and in being so largely dependent for its labour on coolie immigration from India. Each coolie is estimated to cost 17*l*. to bring in, and 12*l*. 10*s*. to go out. He must also be maintained during the period of indenture by regular wages at a prescribed rate. Coolie immigration began in British Guiana so long ago as May 1845. Up to June 1848 the total immigrants from Calcutta and Madras had reached 11,437. This number in 50 years has gradually risen to 105,463, and now forms more than a third of the total population of the Colony.

26. As showing the great dependence of the sugar industry on coolie immigrants we find, as already stated, that 90,492 persons were returned as directly engaged in the sugar industry in 1891.

Of these, 71,771, or 79 per cent., were coolie immigrants, leaving only 18,721, or 21 per cent., to be divided amongst all other races. It is not a matter of surprise, therefore, to find the opinion expressed in evidence that the existence of the sugar industry on the present scale is entirely dependent on the continuance of coolie immigration.

27. The cost of production per ton of sugar has been greatly reduced of late years. From figures supplied by the Colonial Company, Limited, it would appear that after deducting the offal, the net cost of producing a ton of sugar has been reduced from 16*l.* 1*s.* 7*d.* in 1883–84 to 9*l.* in 1895–96. This reduction has been chiefly effected in the cost of manufacture. In 1883-84 the cost of manufacture only was 9*l.* 15*s.* 10*d.*; in 1895–96 it had been gradually reduced to 4*l.* 15*s.* per ton, a difference of 5*l.* 0*s.* 10*d.* The reduction in the cost of cultivation (principally wages) was not so great. In 1883–84 it was 6*l.* 6*s.* 7*d.*; in 1895–96 it was 4*l.* 5*s.*, a difference of 2*l.* 1*s* 7*d.* per ton. In one or two exceptional instances, with a rich soil and good seasons, the cost of production, without offal, has been brought as low as 8*l.* 0*s.* 6*d.* The average for the Colony is, however, placed at 9*l.* 10*s.* per ton. These reductions have been effected by the introduction of new and improved machinery, and by carrying on operations on a large scale with high technical supervision. For several years the value of the sugar machinery imported into the Colony has exceeded 100,000*l.*, and in a single year (1884) it had reached a value of 182,576*l.* The average value per annum over a period of 18 years was 74,394*l.*, while the total amount expended on new machinery during that period was £1,339,098. It is stated in evidence that wages on sugar estates have "been reduced during past years by 20 to 25 per cent," but it is added that the cost of living is somewhat less than formerly.

28. Although the area under cultivation has been reduced, it is clear that the production per acre has been increased, owing to a better selection of land and improved methods of applying artificial manures. In extracting the juice from the cane, with few exceptions the mills are fitted with double and triple crushing machinery with or without maceration, and by diffusion in two factories. With the present relative prices of sugar and coal the diffusion process recently introduced compares unfavourably with that of double crushing.

In canes containing 12 per cent. of fibre the following percentages of sugar are extracted in the form of juice. Single crushing, 76 per cent.; double crushing (dry), 85 per cent; double crushing (with 12 per cent. of dilution), 88 per cent.; triple crushing (with 10 per cent. dilution), 90 per cent.; diffusion (with 25 per cent. dilution), 94 per cent. From this juice there is recovered 84 to 88 per cent. in the form of marketable sugar, polarising on the average about 95 degrees.

29. The average return of sugar obtained all over the colony is placed by Professor Harrison at about 9 per cent. of the weight of canes. This is not so high as in the best beet-growing countries, but is equal to the average return obtained with beet in France. Taken as a whole, it may be stated that the extraction and

manufacture of sugar on the large estates in British Guiana are carried on with the best machinery and with the highest technical skill. It is generally believed, by those confident to offer an opinion on the subject, that the economic maximum under present conditions has practically been attained.

30. The clay soils of British Guiana are excellently suited for sugar-cane cultivation. They are, according to Professor Harrison, rich in potash, which is the soil constituent likely to be first exhausted by continuous cane cultivation. Under the present system of agriculture in British Guiana, probably from 25 to 30 per cent. of the nitrogen in the cane, 66 per cent. of the potash, and 45 per cent. of the phosphoric acid are returned to the soil by the tops and dry leaves. There is, therefore, little chance of the exhaustion of the soil by continued cropping, except of the immediately available nitrogen, which is easily and cheaply supplied in the form either of sulphate of ammonia or of nitrate of soda.

31. As regards the system of manuring adopted in the colony, the sub-committee appointed by the Planters' Association states : "During the last 15 years, systematic and extensive series of "experiments with manures have been carried out by the Colonial "Company, Limited, in the eighties, and by the Government "botanist and chemist more recently ; besides isolated and inde- "pendent experiments on nearly every estate in the colony, and "the system of manuring adopted has been, in the main, based on "the results of these experiments."

32. The fungus disease in canes, so prevalent in some of the West India Islands, has latterly been observed also in British Guiana. In October and November 1895, large areas were affected on the east and west coasts of Demerara, in the Essequebo Islands, and on the coast of Essequebo. The estates on the banks of the rivers had not suffered, whilst those in Berbice had apparently escaped. On some estates the loss due to disease was estimated at 10 to 20 per cent. On one estate (Leonora) in 1896, "there was a heavy crop of canes, found to be poor in juice when ground, "owing to the presence of fungus." The yield in this instance was at the rate of 1·81 tons per acre, while previously (1893) it had been as high as 2·14 tons per acre. The planters acting upon the technical advice afforded by the Government botanist and the Government analyst have adopted precautionary measures, and the disease is apparently not spreading at the present time.

33. In conclusion, it may be assumed that as regards the general suitability of the soil for the cultivation of sugar cane, as regards the methods of cultivation and manuring pursued during the last 15 years, and as regards the character of the machinery and skill devoted to the manufacture of sugar, British Guiana occupies a high position as compared with other cane-growing countries. Nevertheless, it is evident that with present prices the margin of profit is reduced to a minimum. Where the soil is exceptionally good, and with a succession of good seasons, the best equipped factories may still survive, but no provision can be made for bad seasons or other unfavourable conditions, and the outlook for the colony as a whole cannot be regarded as promising.

34. *Experiments to improve the sugar industry.*—Of late years valuable experiments directed to improve the sugar industry have been carried on on land attached to the Botanic Gardens by the united efforts of Professor Harrison, the Government Analytical Chemist, and Mr. Jenman, the Superintendent of the Botanic Gardens. The reports so far issued have proved of considerable service to planters, and it is admitted that the results of the manuring experiments have already contributed both to improving the yield of sugar, and to reducing the cost of production. The cane most suitable for cultivation on heavy clay and loamy soils is the Bourbon cane, while on lighter lands the White Transparent and the Red Ribbon varieties are preferred. During the experiments conducted in British Guiana, Messrs. Harrison and Jenman have carefully cultivated and examined 120 varieties of canes obtained from various countries. These have been reduced to 42 distinct varieties, while numerous seedling canes have been raised and tested as compared with the Bourbon and other varieties. Each variety is cultivated with the object of determining the yield per acre and the chemical composition of the juice. Those only that show points of merit in both directions are retained, the others are destroyed.

35. Already several new varieties have been raised promising a higher percentage of sugar than any cane hitherto known. One or two on a purely experimental scale have yielded results from 15 to 26 per cent. higher than the Bourbon cane on the same soil, and under the same conditions.

"For instance," according to Professor Harrison, "whilst the "Bourbon cane grown on the same land contained on the average "of four crops 13·2 per cent. of sucrose, No. 95 cane contained "16·1 per cent.; No. 74, 15·8; and No. 61, 15·2 per cent. of "sucrose." These results if expressed in pounds of sucrose per gallon of juice are as follows :—

Cane.	Pounds of Sugar per Gallon of Juice.	Increased Percentage over Bourbon Cane.
Bourbon	1·710	—
No. 95	2·147	26
„ 74	2·014	11
„ 61	1·963	15

"Again, some seedling varieties ratoon, as a rule, better than the Bourbon does. On the experimental ground this has resulted in the following returns over four crops :—

Cane.	Yield of Bourbon taken as 100.	Tons of First and Second S gars per Acre.
Bourbon	100	2·50
No. 78	144·8	3·62
„ 95	134·8	3·37
„ 102	105·2	2·63
„ 74	103·6	2·59

36. Further trials are necessary before such canes can be confidently recommended to planters. It is evident, however, that improvement is possible, and if a larger area of suitable land were devoted to experiments and the vote increased, there is every promise of success. The investigations are hampered by insufficient funds, by lack of sufficient area of suitable land as well as by insufficient time at the disposal of the officers concerned. The grant made by Government is about £200 annually. No other funds are available. For the first time in the history of the sugar-cane it has been shown that it is possible to increase its sugar contents by the same methods as have led to the greater sugar contents of the beet. We have thus a most effective means of improving the sugar industry; and considering the importance of these experiments, not only to British Guiana but to the whole of the West Indies, it is very desirable that they should be steadily extended and improved. The present investigators are admirably qualified to carry on this valuable work. As indicated in the Appendix it is proposed to afford assistance to continue these experiments in an extended form from Imperial funds.

Development of Subsidiary Industries in British Guiana.

37. As already shown, the whole activity of British Guiana during the last 60 years has been confined to the narrow strip of land along the coast. In spite of the vast extent of rich and fertile lands in the interior, with the exception of the gold industry, comparatively nothing has been done to develop them, and consequently the Colony is now in so critical a condition, owing to its entire dependence on a single industry, that its very existence as a civilised country is in jeopardy.

38. It may be safely assumed that the labour of nearly one-third of the present population of the Colony is unproductive —in the sense that it adds nothing to the general wealth of the community. The removal of this portion of the population, not dependent on the sugar industry, from the coast lands on which they are now settled to the river lands of the interior must necessarily be a slow and tedious process. Should the gold industry become more flourishing, a portion of the negro population will eventually find its way to certain parts of the forest region, and in time small more or less permanent settlements will be formed. In the meantime, however, there are lands immediately accessible on the banks of the Demerara, Essequebo, and Berbice rivers, formerly occupied by cacao or coffee estates, which were gradually abandoned as the coast lands were taken up. These lands are, partially at least, in the hands of negroes, who are quite unable to utilize them, and as the question of the ownership of many of them is obscure and involved they can neither be sold nor leased to persons anxious to acquire them. A Commission entitled the "Titles to Land Commission" was appointed some years ago to investigate the terms under which these lands were held. The Commission presented a report, but no action has hitherto been taken upon it.

To clear up defective titles, it was suggessed that a short Ordinance should be passed, empowering the Supreme Court to grant titles under certain terms to persons who have been in possession for at least 30 years. It is needless to say that it is most important that these lands should be made available for starting new industries as, from their proximity to the coast region, they are the first that should be settled.

39. The acquisition of Crown lands in other accessible parts of the Colony should be rendered as easy as possible consistent with their due utilization for permanent cultivation. At the present time Crown lands are sold at the upset price of $1 per acre. The actual cost of 250 acres of Crown lands, including survey fees and stamps, is $323.50. The purchase money need not in every case be paid at once. One quarter only of the amount must be paid on taking possession and the balance may be paid in three equal annual instalments, commencing one year after the first year. The unpaid balance is charged with interest at the rate of 6 per cent. per annum. Crown lands are leased at the rate of 4.8 cents per acre per annum. The rental paid on 250 acres of Crown land (including survey fees and stamp duty) for the first year is $68.50.

40. The true value of the Crown lands is little known even in the Colony itself. Outside nothing is known of them. The Government might, in the first instance, prepare a map showing the position of the most accessible Crown lands in its possession, and it might assist in their development by establishing one or two experimental stations on each river, as object lessons, and to supply seeds and plants to settlers. These undeveloped Guiana lands are amongst the richest existing in any part of the tropics. It is almost inconceivable that such lands should have been so long neglected, while comparatively poorer and less accessible lands are being sought for in the heart of Africa, or in such distant parts of the world as Borneo and New Guinea.

41. In the development of the Crown lands of British Guiana there are practically three classes of people that may be attracted to them. When the suitability of these lands for tropical cultivation is known abroad, some of them will be taken up by Europeans with capital, prepared to invest it in establishing plantations of coffee, cacao, spices, and fruit, on the same lines as those in other parts of the tropics. Such men would either carry on their own cultivation or employ skilled and experienced men from other colonies. A considerable amount of English capital is at present diverted to foreign states, from a mistaken idea that there is no suitable outlet for it in our own colonies. From a somewhat extensive and intimate acquaintance with the cultural industries carried on in various parts of Her Majesty's possessions, I am able to state that I know nowhere of such an extensive area of rich and fertile lands, with a comparatively healthy climate, and within easy reach of such good markets, as these Crown lands of British Guiana. They can grow nearly every tropical product in demand, either in the new world or the old. Further, they are under the control of a firm and stable Government, which can offer a stronger guarantee for the permanence of any enterprise that may be started under its auspices than any other in South America.

42. There is also a class of Europeans in the Colony itself that might usefully direct their attention to these Crown lands. They are described by Mr. Jenman as "chiefly of British birth, and "possessing excellent training for the successful and economical "management of agricultural enterprises." These are the overseers of sugar estates, who at present supply the sinew and backbone of the great staple industry of the country. Owing to the fewness of the estates and the rare chances offered for becoming managers, these men are often left stranded without hope of promotion, or they throw up their posts and seek other employment. These men, with good local knowledge and inured to the climate should prove most valuable as pioneers in opening up the Crown lands of the Colony. Many are men "who possess skill "and ingenuity in dealing with difficulties, and tact in the "management of workpeople . . . also the patience to "wait during the few years required for the property to be "created . . . Such men, starting with a small capital, care-"fully counting the cost beforehand . . . and adapting their "undertakings to their means, could not . . . fail to succeed." Should an appreciable number of the sugar estates in the Colony be thrown out of cultivation, or amalgamated to form larger properties, many of the present overseers will no longer be required. It would be a wise policy on the part of Government to make free grants of lands, under certain restrictions, to a selected number of these men, and endeavour to keep them in the Colony. They would form the nucleus of a very valuable community for the development of new industries.

43. The class of small farmer, or black peasant, is not a large one in British Guiana. It is chiefly confined at present to the negro villages on the coast, and to the sugar estates, where plots of land are rented for growing plantains and provisions. It is in evidence that many of the latter, as also some of the free coolies. are anxious to obtain lands of their own, and are prepared to pay reasonable prices for them The Government has already in hand a scheme whereby these people are to be settled on estates bought for the purpose. On the coast, both negroes and coolies readily take up land, but there is always a difficulty as to the maintenance of the drainage, and unless this is undertaken by some central authority the result is unsatisfactory. On the river banks the question of drainage is not so pressing. In fact, some of these lands possess natural drainage, and their settlement offers no special difficulty. The coolie immigrants take so readily to rice cultivation, and the raising of small stock and poultry, that for some time, at least, they would find it advantageous to settle on or near the coast lands. Some, however, might be engaged on coffee and cacao estates on the river lands, where already, from their tractability and steady habits, they have proved of great service.

44. To control and encourage the means here suggested for settling the Crown lands of British Guiana, it is desirable to form a permanent Board of Agriculture, composed of nominated members of whom three or four, at least, should be Government officials. This board should be supported by public funds, and devote itself entirely to the work of promoting subsidiary industries. A board, as here indicated, was strongly recom-

mended by the Special Commission on Minor Industries, appointed by Lord Gormanston in 1888. This Commission presented its final report in 1895, and one of its recommendations is contained in the following words :—"The depressed condition "of the staple industry of the Colony at present, and the pro- "spective outlook as to its improvement, strongly impress upon "your Commission the necessity of urging upon the Government "of this Colony to take steps to foster the development of "agricultural products to replace the deficiency caused by the "decline of the main industry."

45. The present circumstances of the Colony are even more depressed than they were in 1895 and it is desirable that no time should be lost to utilize the most accessible Crown lands of the Colony, leaving to the future the development of interior lands, which will require means of communication of a more costly character.

Subsidiary Industries on the Coast Lands.

46. On the coast lands occupied by sugar estates it is admitted that the conditions are not very favourable for subsidiary industries, and, as far as I am aware, there are no industries that could immediately or in the near future on such lands take the place of sugar.

47. If the sugar industry became greatly reduced or abandoned in British Guiana, these stiff clay lands could therefore be turned to little account in promoting the future prosperity of the Colony. They are well adapted for growing sugar, but fit for little else. They are mostly under sea level, and entail a considerable yearly expenditure in drainage and maintenance. The climate is also unfavourable to the growth of plants usually cultivated in the lowlands in the tropics, as few of them can bear prolonged dry seasons, and fewer still the strong trade winds that blow steadily for many months in the year.

48. These remarks, it must be remembered, apply only to what are known as the front lands of the Colony now actually under cane cultivation. They form a narrow strip of alluvium along the sea-board, and extend only a few miles up the estuaries of the principal rivers. The area of these lands is only one-thousandth part of the total area of the Colony, and only about one-twentieth part of the estimated cultivable lands in private hands. Nevertheless, in this small area is now concentrated all the various agencies which have built up the wealth of British Guiana, and here, also, the great majority of the population resides and gets its means of subsistence.

49. A general abandonment of sugar would necessitate a complete change in the industrial condition of the Colony, and a gradual transfer of a large portion of the population from the coast to the river, and other lands in the interior. If, however, the sugar industry is enabled to survive even in a reduced condition, it may be possible to utilise some of the coast lands for industries which, though they may not supply the place of sugar, may usefully supplement the food resources of the Colony and

render it less dependent upon imports from other countries. Of these industries the most promising are the cultivation of rice, fruit, cocoa-nuts, and the raising of cattle.

Rice Cultivation.

50. As the coolie immigrants constitute more than one-third of the population of British Guiana, rice is largely consumed in the Colony. The imports in 1895–96 were 49,262,831 lbs. (about 22,000 tons), of the value of £183,394 There is a Customs duty on rice at the rate of 35 cents. per 100 lbs., yielding a yearly revenue of about £30,000. Rice sells locally at 20 cents. per gallon (8 lbs.). Considering the favourable conditions that have always existed for the cultivation of rice in British Guiana, it is a matter of surprise that it has not already become an established industry.

51. As long as high prices ruled for sugar, possibly it was more profitable to grow sugar than rice. Under present circumstances there can be no doubt that the planters of British Guiana should follow the example of the cotton planters in the Southern United States, and during a period of great depression in their staple industry endeavour to produce most of the food stuffs, fodder, and other necessary articles on the spot. It is a suicidal policy to purchase such necessities in foreign markets with sugar at present prices. The suitability of the coast and river lands in British Guiana for growing rice is admitted on all sides. Professor Harrison states that the soil is as well suited for rice cultivation as for sugar. Further, the coolies coming from the rice-growing districts of India are well acquainted with the cultivation, and readily enter upon it. In the Report of the Special Commission on Minor Industries it is stated : "The opinions expressed by those who "have gained practical experience on the subject are unanimous "as to rice being a product which is being, and can be, profitably "grown in this Colony. The very large and general consumption "of this article of food, the favourable condition under which it "can be grown, and the excellent quality of the grain produced, "fully justify the encouragement of the cultivation of this "product, which it may be hoped, after supplying local wants, "may in time form an item in this Colony's export list."

52. The evidence of Mr. A. R. Gilzean, who has an intimate knowledge of rice growing, embodies the experience of 11 years in the following words : "(1) There are several thousand acres "in the Colony on the front lands of the estates with drainage "and water supply available which can grow three crops of rice "a year very profitably : (2) There is always a good demand for "creole rice at a higher price than imported rice : (3) The crops "after the first one are large and wonderfully regular, being "practically unaffected by the seasons : (4) The cultivation of "rice does not exhaust the land, so neither manuring nor resting "have to be resorted to."

53. Mr. Bassell Winter, of Coffee Grove plantation, states : "For "10 years the coolies living on or near Coffee Grove have culti-"vated successfully over 100 acres of rice on this estate, and I

" think it might be grown nearly all over the Colony on the low-
" lying front lands." According to this witness the first cost of preparing the land by digging, levelling, &c. is somewhat heavy, and may amount to $16 to $24 per acre. This, once done, does not need to be renewed. The cost of planting, weeding, picking, threshing, and husking (including $8 for rent) amounts to $15.52 per crop. The average return per acre per crop is eight bags of cleaned rice. Five crops are produced in two years. The rice sells locally at about $6 per bag. This is calculated to yield a return of $48 per crop against an apparent expenditure of $15.52 per crop. This is exclusive of the first cost of preparing the land. Mr. Winter further states : " The immigrant population like the
" rice cultivation, and if they can obtain a small piece of land of
" their own on which to build a house with land suitable for rice
" cultivation within easy distance I think a good many would
" settle down in the Colony, thereby saving the cost of their
" return passage, besides which they would contribute to the
" general revenue. There are 250 coolies on this estate, and last
" financial year they took out licences to the value of $315."

54. Mr. H. T. Perkins, the Acting Commissioner of Mines, in a memorandum submitted to the Royal Commission, states: " Rice
" is at present grown chiefly by the East Indian immigrants, who
" have acquired parcels of land in various localities, but there are
" not many of large area. A proper system of water supply and
" drainage and cultivation would be of immense advantage to the
" people, who are too poor to undertake large works of this kind
" themselves. The grain produced is full and well grown and
" furnishes a very nutritious food, being preferred by many
" coolies to the Indian grain. It sells in the paddy for $1.20 per
" bag, and is also a useful food for cattle and horses and pigs,
" and if it were more largely grown on the thousands of acres so
" well adapted for its cultivation, a large export trade might, in
" years to come, be built up by means of sufficient capital."

55. " The best rice lands are in the rear of the sugar estates
" and on the Mahaica, Mahaicony, and Abary creeks and coasts
" the Barima and Waini rivers, and on the Corentyne coasts."
The *Louisiana Planter*, after reviewing the circumstances of the coast lands in this Colony remarks, " all this would indicate an
" ideal country for the culture of rice."

Mr. Andrew Hunter, in evidence before the Royal Commission, mentioned that " on Estates Bath and Adelphi, three-fourths of
" the houses of the coolies are full of paddy rice grown by them-
" selves. . . . Some of them had as many as 25 bags." The Honourable A. Webber stated that " in the first instance there is
" a large field for rice cultivation to supply local consumption.
" . . . That alone would tend to keep a million dollars in the
" Colony."

56. There can be no doubt as to the decided opinion which prevails that rice-growing is a most promising industry on the coast lands of British Guiana. The cultivation so far has been undertaken on comparatively small areas by coolies, and with very crude appliances for threshing and husking the grain.

Recently a loan has been sanctioned by Government for erecting and working one or more rice factories where the rice could be milled and prepared at a small cost for local consumption. The present cost of husking rice by hand-pounding in mortars is estimated at 3*s.* 6*d*, per bag. At well-equipped mills, this could be done at a cost of about 1*s.* 6*d*. per bag. It is confidently anticipated that as soon as mills are established, a great impetus will be given to rice-growing all over the Colony.

Fruit Growing.

57. The principal fruit in large demand in the United States is the banana. This is imported into that country to the value of two millions sterling yearly. Hitherto the chief supply has been obtained from Jamaica, Cuba, and Central America. British Guiana has taken no part in a fruit trade, and the opinion was generally expressed to the Commission that it was too far from any of the United States ports to participate in it. This opinion is inconsistent with a proposal made by Captain Baker, who for many years has taken a leading part in the development of the fruit trade in Jamaica. On the 13th February, 1890, Captain Baker made a definite proposal (as recorded in the Report of the Commissioners on the Proposed Banana Industry) as follows :—
"On condition of the payment of a Government subsidy of "$25,000 to the Boston Fruit Company for five years, it under-"takes to establish a fortnightly steam service between British "Guiana and the United States with steamers capable of carrying "10,000 bunches of bananas, the service to be changed into a "weekly service after the first year. The minimum price to be "paid locally for the bunches to be as follows : 30 cents. for "nine hands and upwards ; 20 cents. for eight hands ; 10 cents. "for seven hands. The purchase of bunches under seven hands "to be optional." The Boston Fruit Company was prepared to furnish a guarantee, but required in turn an assurance that a sufficient area of land was placed under cultivation by responsible persons to ensure a regular shipment of 10,000 bunches. The Company further undertook to supply suckers of the special banana cultivated for export purposes in Jamaica at the rate of $25 per thousand.

It is evident that this proposal would not have been made by so competent and experienced an authority as Captain Baker unless he was satisfied that a fruit trade between British Guiana and the United States was a practicable one. The proposal was ultimately dropped, chiefly because it was found that bananas were grown only to a small extent on the plantain lands in the Colony, and there was then no disposition on the part of the farmers to embark in the industry. It is believed that if the Jamaica banana were regularly cultivated on river lands in British Guiana, there would be a possibility of establishing a fruit trade not only with the United States, but eventually with Europe.

In the Reports of the Colonial and Indian Exhibition, 1886, p. 140, it is stated : "Owing to the enterprise of Messrs, Scrutton "and Sons in fitting up one of their steamers with a cool chamber,

'fresh tropical fruits from British Guiana were among the most "interesting features of the colonial market. It is now clearly "demonstrated that by careful and judicious treatment with "storage in a cool chamber, numerous tropical fruits from the "West Indies can be brought to England in a perfectly sound "condition. Bananas arrived from British Guaina on several "occasions which were sold for the first time in the English "market. . . . As an experiment, the enterprise has been "thoroughly successful. . . . In the rich alluvial soils of "British Guina, all tropical fruits are capable of being culti-"vated . . . and a large and undeveloped field of industry "is connected with them."

58. Jamaica is now engaged in a serious effort to establish a fruit trade with this country. British Guiana is nearer than Jamaica, and it possesses also a considerable advantage locally in the ready transport of fruit by means of its numerous rivers, creeks, and canals. The value of a fruit trade in assisting to establish the cultivation of cacao, coffee, or other industries is discussed later.

Cocoa-nuts.

59. The cultivation of cocoa-nuts has existed in British Guiana from an early period, but it has apparently never attained large dimensions. This is probably due to the unsuitable character of the stiff clay soils on the coast, and to the prevalence of disease. In 1847 the number of cocoa-nuts exported amounted to 466,530. At present, large quantities of nuts are used locally by the East Indian immigrants. The recent exports are only slightly in excess of those of 1847. Mr. William Smith's evidence before the Special Commission in 1895 indicated that at Mahaicony Creek and other localities the conditions were favourable for cocoa-nut cultivation, but the nuts were small, and consequently they fetched low prices. The present condition of the industry deserves to be carefully investigated. Only specially selected lands should be planted, and suitable manures applied to ensure large nuts. In America, husked nuts only are accepted, and these are packed in bags of uniform weight containing nuts not less than $3\frac{3}{4}$ inches in diameter.

Cattle Industry.

60. At present "when a sugar estate fails to pay, it is either "absolutely abandoned, attached to an adjoining estate, or turned "into a cattle farm." The conditions for cattle raising in the coast region are probably not so favourable as they would be further inland, and especially on large stretches of savannahs in the interior.

61. During the year 1894–95 there were 560 cattle imported, presumably for food purposes, of the value of £4,456. During the same period the value of the pickled beef imported was £25,092, and of the pickled pork £49,461. It has been shown by considerable experience in Jamaica that excellent pickled beef can be produced in the tropics, and pigs could be readily raised on

the plantain farms of British Guiana. The total imports of nearly £80,000 for cattle, beef, and pork could be greatly reduced if attention were steadily devoted in that direction.

62. From the "Official Year Book of Queensland" for 1897 it is evident that the sugar planters (chiefly cane farmers) in that Colony are successfully dealing with the problem of producing pork and bacon locally. We read: "Of other tropical and semi-"tropical crops, maize and sweet potatoes are largely grown, "farmers of late years giving more attention to feeding these "crops to pigs, and thus hardening the latter for bacon. There "are several bacon factories which are large buyers of pigs "suitable for curing, and which turn cut hams and bacon not to "be surpassed by the English article. The amount of bacon "cured last year (1895) was 4,941,512 lbs.

63. Mr. Gilzean, who has given attention to the subject, has expressed the opinion that cattle raising under suitable management is likely to become an important industry. In a letter addressed to the Special Commission on Minor Industries he states: "Cattle farming has paid very well for some time, and "the industry is capable of very great development . . . with "attention to breeding and feeding I believe we could grow oxen "to average 10 to 12 cwt. . . . most of the abandoned cane "fields are infested with grasses that are eminently fitted for "feeding cattle, and there are extensive savannahs in different "parts of the Colony where large herds can be raised . . . "The Government should encourage the industry by raising the "protective duty on cattle imported for slaughter, by giving a "bounty for each imported bull of approved breed . . . by "importing pure bred cattle, and breeding stock from them at "the experimental farms at Onderneeming and the Penal Settle-"ment for sale, as is done at the Trinidad Government farm, and "by granting small sums towards local agricultural exhibitions "in each district of the Colony."

Subsidiary Industries on Interior Lands.

64. The industries suited for the river and interior lands as distinct from the coast lands of the Colony comprise practically all the plant industries of the tropics. Mr. Jenman states that there exist vast tracts of land suitable for the cultivation of economic plants, "in fact, the land is so varied (taking into account "variations due to altitude) that there are few tropical subjects "of economic industry that might not be produced here." At present "the want of easy means of communication and quick, "cheap transit to town of produce prevents lands above the first "falls in the rivers being used for agricultural purposes." When, as is probable, such communication is provided, the development of the interior lands of British Guiana could be begun in earnest. There are, however, extensive areas of river lands already accessible, and these, as has been already suggested, might be first taken in hand.

65. The experiments so far carried on are on the Demerara, Pomeroon, and other rivers, where coffee, cacao, kola, cassava, plantain, ginger, arrowroot, and various fruits have been grown. In some cases experiments have been started on coast lands adjoining some of the sugar estates, and, as might be expected, the results have invariably been of a disappointing character. It is probable that the unsuitable character of the soil, and exposure to strong winds, were responsible for this, but it is probable, also, that there was a want of practical knowledge of the proper treatment required by the plants. The experiments were, therefore, doomed to failure from the first. Hence the numerous references in the evidence to the unsuccessful results of efforts made to grow other plants than the sugar-cane are of little value. To start new industries it is essential at first, at least, to introduce skilled and capable men from other countries to select the land and carry on the cultivation on the most economical and approved principles. Hitherto the plantations of coffee and cacao attempted to be established in British Guiana, owing to various circumstances, have cost three or four times what they ought to have cost, and the processes adopted for curing and marketing the produce have been of the crudest and most costly description. Such instances are often quoted as showing the impossibility of successfully establishing subsidiary industries in British Guiana. On the other hand, when experienced men have been employed, and suitable land selected, the results have been as successful as in any similar pioneering efforts in other countries.

66. By the courtesy of the Government, and accompanied by Professor Harrison, I was enabled to visit several coffee and cacao plantations on the Demerara River. The highest point reached was Wismar, about 60 miles from Georgetown, where the new railway connects with the Essequebo River, above the lower falls. This railway will afford a convenient route to the gold fields, and is likely to greatly assist in opening up the interior. In addition, a visit was paid with the Hon. A. Weber and Mr. Thomas Garnett, to lands on Canal No. 1, practically within the coast region. Here Liberian coffee was growing most successfully. The cacao was not so flourishing, and was confined to patches only. With good drainage these lands should become most valuable. At present they are liable to serious floods, and the cultivation is periodically injured.

67. The *Demerara Daily Chronicle* of 25th October 1896 directed attention to the list of economic products that were exhibited for competition at the Horticultural Show held in Georgetown, and the observations of the judges thereon : "That "list," it states, "will show what a large number of economic "products British Guiana is capable of producing which might, "with judicious management and careful development, prove "valuable additions to our articles of colonial export ; and it may, "perhaps, suggest a channel to which the energies and intelli-"gence of our peasantry might be directed with advantage to "themselves as a class and also to the colonial community "generally."

Coffee.

68. Coffee was formerly largely cultivated on the east and west banks of the Demerara River, and in nearly every part of the county of Berbice. Plantation Schoonoord, now an important sugar estate in the coast region, was originally a coffee estate, and was purchased in 1816 (with the slaves upon it) by Nichola Marie Manget for 84,000*l*. Mr. Gustav H. Richter, in evidence, states that formerly Berbice coffee was in great demand on the Continent, "it could not be beaten for quality." He adds: "This "coffee could be grown again, for the land is there, labour is "plentiful, and the Colony offers everything that is desirable for "re-starting such an industry."

69. The highest production of coffee in British Guiana was in 1821, when it reached 124,086 cwts., or about one-third larger than the present export of coffee from the island of Jamaica. In 1833 this production had fallen to less than one-half, the actual figures being 51,860 cwts. From this time the coffee exports rapidly declined, until in 1849, 16 years later, it had almost entirely disappeared.

70. At the present time coffee is largely imported into the Colony. The imports in 1895–96 were 236,484 lbs., of the value of 7,336*l*. 12*s*. The early production of coffee in British Guiana was dependent on slave labour and exceptionally high prices. Although these conditions have passed away there can be no doubt that the soil and climate are as favourable as they ever were. The evidence on these points is overwhelming. In the Report of the Special Commission on Minor Industries the conclusion arrived at is contained in the following words:—

"Coffee appears to stand next in importance (to rice) as a profitable product. It should commend itself to capitalists and cultivators, as harvesting may be expected within three to five years of planting. Liberian coffee is the hardiest plant, yielding abundantly, and commanding good prices in the market. The mode of cultivation is simple, good drainage being an essential requirement. The present price of coffee should give profitable returns to the resident proprietor or peasantry."*

71. Mr. Jenman, in a recent memorandum, states: "Except on "certain lands in certain districts the cultivation of coffee and "cacao is not now experimental; both have been grown for many "generations, proving that soil and climatic conditions on all the "rivers and creeks are highly suitable to their successful culture. "Remnants of old settlements and plantations still exist in places "on nearly all the rivers. I have seen cacao trees, survivals from "that time, where the forest had grown up again on the ground "around them, 40 and 50 feet high, still bearing the finest pods "to be seen. Other survivals met with at such places are "oranges, limes, citrons, avocado pears, star apple, guinea pepper, "mangoes, &c."

72. Professor Harrison adds: "On the banks of the Pomeroon

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* Since this was written the price of coffee has greatly declined. but the main argument still holds good.

"River are soils of remarkable fertility, which are cultivated by "small settlers for a distance of from 30 to 40 miles from its "mouth. On these soils, coffees, both Liberian and Mocha, "flourish wonderfully."

73. I am able to support, from my own observations, the statements already made in regard to the flourishing character of the Liberian coffee trees in British Guiana. On Canal No. 1, within a few miles of Georgetown, and on several plantations on the Demerara River, Liberian coffee is more luxuriant, and yields larger crops than possibly in any other part of the world. It is impossible to speak too highly of the great advantage to the Colony which this single fact implies. The trees are thoroughly healthy, and heavily laden with crop. In a few cases only were suitable appliances in use for curing the produce.

74. On one coffee estate on the Demerara River the Liberian coffee is cured by fermenting the ripe cherries and afterwards pounding them, when quite dry and hard, in a mortar. This is a very primitive method, but it possesses some merit, and is well adapted for use by small settlers. The coffee is of good quality. The total cost of turning out the crop in this manner is about 5*s.* per cwt. Picking costs about 4*s.* 6*d.* per cwt. So that the total cost of picking and curing the produce ready for shipment is under ten shillings for what sells for about 40*s.* to 60*s.* per cwt. The coffee produced on this estate finds a ready market locally. With suitable appliances the cost of curing might be reduced to about one-half, at least.

75. As regards labour for coffee and cacao estates, it will be necessary to draw it from either or all of the following sources described by Mr. Jenman :—"Most of the rural negro population "understand both provision farming and certain branches in "sugar cultivation, to which they confine their labour. The "Portuguese, excluding the native-born, make good industrious "farmers, and raise the bulk of the provisions produced in the "Colony. They are less acquainted with estate work, but have "some knowledge also of that. Coolies having been indentured "to estates, are mostly well versed in cane cultivation, and a "considerable number understand rice-growing, having learnt "that in India before coming to this country. Some of the free "coolies have acquired a knowledge of farming. The Chinese "are excellent agriculturists, intelligent, resourceful, and "industrious; but as the immigration has been stopped for "many years now, most of them still left have turned to other "business, some to farming up the rivers, others burning charcoal "and cutting hardwood in the same regions."

76. Mr. Jenman adds :—"If estates were laid out affording "land for the erection of coolie houses, with guaranteed con-"tinuous labour and fixed wages, allowing them to earn reason-"able sums per week, Chinese and coolies, who show less "prejudice to river life than others of the labouring population, "would gradually settle on such estates with their families."

77. The indications are in favour of there being a moderate supply of labour, at least for the first estates started on the

Demerara River and elsewhere ; but in the event of a considerable development in new districts it will be necessary to look for other sources. If there is likely to be a reduction in the area under sugar-cane, some of the labour thus set free might be attracted to the coffee estates, and later on a scheme might be organised for obtaining a regular supply of immigrants from the over-populated island of Barbados.

78. In these days, when the price of all tropical produce is exceptionally low, it will be necessary to exercise the greatest care and judgment in starting new plantations. British Guiana can offer exceptional advantages in soil and climate, and in proximity to suitable markets. These are most important elements on which to base the existence of large and successful industries. So far the labour required on the coffee and cacao estates now existing is quite equal to the demand. On Coverden Estate Mr. Barclay employs free coolie and some negro labour at wages ranging from 1s. to 1s. 8*d*. per day for unskilled labour, and 2s. per day for skilled labour, such as pruning, &c. At task work slightly higher wages are earned. Houses are provided in all cases. A point of some importance is that both coffee and cacao require less labour per acre than the sugar cane. Mr. Barclay, from his own experience, is of opinion that "cacao would only "require about one-fourth of the number of people that cane "would."

Cacao.

79. Incidentally references have already been made to the cultivation of cacao in British Guiana. In former days cacao was chiefly grown in the county of Berbice. The maximum yield was reached in the year 1820, when 113,956 lbs. were exported. This quantity gradually declined until the year 1832, when it finally disappeared. The revival of cacao cultivation is of a comparatively recent date. The plantations now existing are on No. 1 Canal, and on the east bank of the Demerara River. Mr. Jenman points out that the moist atmosphere of the forest region inland "is essential to the well-being of cacao and "several other cultivated plants. In regard to this, as in many "other things, we may learn a lesson from the experience and "practice of the former Dutch settlers. In different parts of the "Colony remnants exist of these cacao plantations, but all are on "the banks of the rivers, and, as a rule, distant from the estuaries "and coast."

80. The cacao estates visited on the Demerara River were Land of Canaan, 17 miles above Georgetown, Coverden, a little higher up, and Vryheid, about 35 miles from Georgetown. These are in charge of competent men, and regularly visited by the proprietors, who live in or near Georgetown. Vryheid is the property of the Hon. A. Weber ; it has 173 acres established in cacao of various ages, yielding an average crop of 28,000 lbs. per annum. In a good year as much as 40,000 lbs. have been produced. The trees were in a healthy condition. Coverden is owned by Mr. R. A. Barclay, manager of a sugar estate, and is in charge of an experienced cacao planter from Trinidad. The cultivation and

upkeep of this property are equal to anything in the West Indies. The yield of trees now in bearing is about 50,000 lbs., bringing in a gross return of £1,040. Mr. Barclay's evidence given before the Royal Commission is most valuable, as indicating the possibilities of establishing subsidiary industries on the Demerara River. Some parts of the estate have been established by the aid of catch crops, which have brought in a total return of £1,200 for plantains and tanniers, disposed of in the Colony.

81. Land of Canaan, the property of Mr. Charles Ross, is established both in Liberian coffee and cacao. There are also some flourishing kola and nutmeg trees. This is in charge of an intelligent black man, supervised by frequent visits from the proprietor. The estate is carefully managed, and the cacao trees are bearing good crops. It must be remembered that all the coffee and cacao estates so far established have been pioneering efforts, and, as one of the pioneers stated in evidence, "if he were to "commence again he would plant his estate at one-half the cost." It cannot be too frequently urged that no new industries should be attempted to be started in British Guiana, except by men with a special knowledge of them. A coffee or cacao planter requires as much training and experience as a sugar planter. The failures and disappointments hitherto recorded in regard to subsidiary industries in this colony have been almost entirely due to a want of knowledge and to errors in the selection of land.

82. A very important means of reducing the cost of establishing coffee and cacao plantations would be to find a market for the bananas and plantains that might be grown on the land as catch crops during the time the permanent trees are attaining the bearing age. On this point I cannot do better than quote Mr. Jenman, who, in 1888, very forcibly stated his views in the following words :—

"Were an export banana or plantain trade once established, a very
"great impetus would thereby, no doubt, be given to the establish-
"ment of cacao and coffee plantations. There is no exportable
"commodity of a character now that will pay the cultivator to
"grow on a large scale between the trees during the years of their
"infancy. Yet it is essential for the well-being of the plants that
"this ground should be kept open and broken up. This necessity
"has been met in the case of the property I have described by
"giving the land, free of charge, and well drained, to people
"living near to grow their ground provisions on ; but in many
"places this system would fail through lack of near residents ;
"and if attempted on an extensive scale in the Colony, or
"generally, the population dependent on, or ready to adopt such
"means of getting a living, would be found absolutely insufficient
"to make it successful. A large and permanent demand for
"bananas or plantains would meet the case entirely, and the cacao
"or coffee planter, while establishing his trees, would be able to
"make a living, with some margin of profit beyond, in the pro-
"duction of these fruits. All cultivators in the Colony, whatever
"be the products they are growing, are interested in this subject.
"As I mentioned in a note a few weeks ago, the cane farmer
"would be enabled to adopt, to some extent, at any rate, a

" profitable and beneficial system of rotation of crops; and now " we see that it is the one essential required, to bring cacao and " coffee properties into existence, and make them pay during the " years of their unproductive infancy. Surely these are strong " inducements to persuade those concerned, however diverse, and " possibly conflicting their interests at present, to combine and " settle, once for all, the question of the possibility of a fruit trade."

Botanic Gardens.

[The Botanic Gardens in British Guiana were started in 1879, on land known as Vlissengen, immediately at the back of Georgetown. The original site was describe l as "a huge undrained morass, intersected by deep canals and choked-up drains, lying more or less under water during the greater part of the year." The total area is about 185 acres. At the present time about 85 to 100 acres are actually under cultivation.

The first efforts to start the gardens were assisted by visits made to the Colony by Mr. Prestoe, the Superintendent of the Botanic Gardens at Trinidad. In August, 1879, Mr. G. S. Jenman, F.L.S., formerly of Kew, who had been for some years Superintendent of the Botanic Gardens at Castleton, Jamaica, was appointed Superintendent. Mr. Jenman still remains in charge.

A loan for 50,000*l* was raised in the first instance for the purchase of the land and laying-out the Gardens. This sum was expended during a period of five years—from 1879 to 1883. In the latter year a further sum of 4,000*l*. was voted for levelling and planting up the land contiguous to the serpentine roads. For some time afterwards the annual vote was 2,500*l*. In 1885–86 it was slightly reduced. During 1896, including the up-keep of various gardens in Georgetown, and the Public Garden at Berbice, it was 4,000*l*. It is probable that the first cost of establishing these gardens, apart from their maintenance of late years has been about 60,000*l*. The houses for the Superintendent and Head Gardener, both of artistic design, were added in 1883.

Owing to the liability to excessive moisture during the rainy season, and to spells of dry weather at other seasons, with strong sea breezes blowing for many months in the year, the task of establishing a Botanic Garden at all near Georgetown wes a work of great labour. The efforts at first must have been attended with almost unsurmountable difficulties. Almost simultaneously, large quantities of water accumulating on the land had to be got rid of by an elaborate system of drainage, while water for irrigation during the dry season had to be regularly pumped by a steam engine erected for the purpose.

It is to the credit of all concerned, that notwithstanding these and numerous other drawbacks, the Botanic Gardens in British Guiana are now amongst the most attractive of any in the tropics. There are extensive drives, well-kept lawns and groups of palms of a very ornamental character.

The roads are carefully planned and in excellent condition. They are constructed of burnt clay and have a reddish tint similar to the roads formed of the disintegrated laterite in the neighbourhood of Colombo, Ceylon. There are numerous lakes with aquatic plants. The indigenous *Victoria regia* is seen not only in the gardens but also commonly in the canals in and around Georgetown. *Nelumbium speciosum* (white and rose-coloured) and *N. luteum* are also very striking aquatic plants. A noted avenue of venerable Orinoque trees (*Erythrina glauca*) is the only attractive feature remaining of the original site. The old gnarled trunks are rendered still more picturesque by being covered with bright-flowering climbing plants. A drive under these trees is particularly cool and refreshing. In 1887, the trees in flower were described as presenting "a most glorious sight"; covered "with a mass of golden-orange bloom."

The principal features of the establishment consist of the nurseries with propagating sheds and shelter houses for ferns and orchids, the flower garden covering a considerable area, the well-kept lawns with turf as close as in an English garden dotted with ornamental trees and shrubs, the lake, drives through a park-land, and winding avenues. The collection of palms includes about 200 species. Some of the specimens are of singular size and beauty. *Nipa fruticans*, a low stemless palm, growing in the salt marshes and coast of the Indian Ocean, is thoroughly established in the lakes. Numerous native birds have made their home in the gardens and are carefully protected. One of the most interesting is the spurwing, which may be seen running over the lily leaves or along the banks. Of other animals the tapir and manatee have small portions of the gardens to themselves, while turtles, electric eels and alligators, are recorded as denizens of some of the lakes.

The Superintendent has also charge of the Victoria Law Courts grounds, Public Buildings grounds, Government House grounds, the Promenade Garden and Queen's College grounds, all at Georgetown. He has also charge of the Public Gardens at Berbice. The latter, consisting of about two acres, was completed in 1885 at a cost of 1,000*l.* It is in care of a native gardener.

The following particulars of the cost of maintenance are taken from the estimates submitted to the Court of Policy of British Guiana for the official year 1896-97 :—

BOTANIC GARDENS.	Approved Estimate. 1895-96.	Estimate. 1896-97.
Fixed Establishment.		
	$	$
Superintendent	1,920*	1,920
Head Gardener, $960 to $1.209 by $72	1,209*	1,200
Assistant Gardener	720	720
Total, Fixed Establishment	**3,840**	**3,840**

* With residence.

BOTANIC GARDENS.	Approved Estimate. 1895–96.	Estimate. 1896-97.
	$	$
Brought forward	3,840	3,840
Exclusive of Establishment.		
To Assistant Gardener. Georgetown, in lieu of quarters	240	240
,, ,, Berbice	60	60
Stationery and Contingent Expenses	150	150
For Botanising Expeditions	960	960
Travelling Allowance	100	100
For maintenance of—		
Flower Garden	4,500	4,500
Nursery	3,000	3,000
Roads	1,000	1,000
Park Land	1,000	1,000
Irrigation Engine	1,500	1,500
Public Gardens, Berbice	720	720
Government House Gardens	1,440	960
Public Buildings Gardens. Georgetown	250	250
Victoria Law Courts Gardens	250	250
Soldiers' Old Burial Ground	100	100
Experimental Cane Cultivation	1,000	1,000
Total, exclusive of Establishment ...	16,270	15,790
Total, Botanic Gardens	$20,110	$19,630

Of late years the indigenous plants of British Guiana have received careful attention. Large collections of dried and living specimens have been received at Kew from Mr. Jenman, and many new species have been figured and described in *Hooker's Icones Plantarum*. Much still remains to be done in investigating the arboreal vegetation of the Colony, and especially in identifying the plants yielding valuable timbers, indiarubber, gums, etc.

The following books and memoirs deal more or less fully with the systematic and economic botany of British Guiana :—

Schomburgk, Robert H. Twelve coloured views in the interior of Guiana, with descriptive letterpress. London, 1841.

Schomburgk, Richard. Versuch einer Fauna und Flora von Britisch Guiana. Leipzig, 1848. 8vo. Flora, vol. iii. (Reisen), pp. 787–1212.

Schomburgk, Richard. Botanical Reminiscences in British Guiana. Adelaide, 1876.

Russell, William. The Cocoa-nut Palm : its Culture and Diseases. Georgetown, 1876.

Schomburgk, Richard. On the Urari ; the Deadly Arrow Poison of the Macusis, an Indian Tribe in British Guiana. Adelaide, 1879.

im Thurn, E. F. Among the Indians of Guiana. London, 1883. 8vo. pp. 445, illustrated.

im Thurn, E. F. Palms of British Guiana : Timehri, iii. (1884), pp. 219–276. Also Reprint.

Oliver, D., and im Thurn, E. F. The Botany of the Roraima Expedition of 1884 : Transactions of the Linnean Society, 2 series, Botany, ii., pp. 249–300, tt. 37–56. The descriptions repeated in Timehri, v., 1886, pp. 145–223.

Hawtayne, G. H. Description of British Guiana, with Notes and List of Exhibits. Indian and Colonial Exhibition, 1886.

Jenman, G. S. Report on some of the Indiarubber and Gutta-percha Trees of British Guiana. Georgetown, 1883.

Jenman, G. S. Report on Balata and the Balata Industry, Forest Laws, &c. Georgetown, 1885.

Jenman, G. S. The Primeval Forests of British Guiana : Gardeners' Chronicle, 3 series, i. (1887), pp. 541–543 ; 573–575 ; 637–639.

Jenman, G. S. Report on Macwarrieballi (*Forsteronia gracilis*), a new Indiarubber Plant of British Guiana. Georgetown, 1888.

Bearing on the sugar industry valuable information is contained in "Reports on the Agricultural Work in the Botanical Gardens," by G. S. Jenman, Government Botanist, and J. B. Harrison, Government Analyst, for the years 1890 ; 1891–92 ; and 1893–4–5. The Government Printer, Georgetown.

A summary of these Reports is contained in "The Results of Recent Scientific Researches into the Agricultural Improvement of the Sugar Cane," by J. B. Harrison. Timehri (1897, pp. 84–135) ; Sugar Cane (1897, pp. 418–432 ; 453–475). [Also a Reprint.]

83. In the development of subsidiary industries the Botanic Gardens at Georgetown are capable of affording valuable assistance. The superintendent has contributed valuable information respecting the resources of the Colony, and he has distributed numerous plants for experimental cultivation amongst all classes of the community. He has also taken an active part in the agricultural experiments carried on in conjunction with Professor Harrison to improve the sugar-yielding properties of the cane, and the

application of suitable manures. The most promising canes are distributed from time to time amongst planters, and the appreciation of the work done in this direction was prominently brought under the notice of the Commission.

84. The following table indicates the number and value of the plants sold from the Botanic Gardens during the last 14 years :—

Year.	Plant.	Value.
		$
1883	11,285	824·28
1884	12,360	1,431·31
1885	10,831	1,632·07
1886	No register of numbers	1,160·10
1887	7,778 11 Wardian cases and 13 tons sugar cane.	743 29
1888	6,518	718·17
1889	6,196	665·08
1890	7,258	1,423·29
1891–2	5,685	964·42
1892–3	6,962	1,436·03
1893–4	4,608	1,093·19
1894–5	5,424	975·59
1895–6	6,222	699·88
1896–7, January	19,765 and 23 loads and 4 barrels sugar canes.	660·42
	110,892	$14,427·12

The large quantities of seeds, seedlings, and cuttings disposed of every year are not included in the above.

85. When the interior lands are in course of being settled it will be found desirable to establish branch gardens in certain districts for the purpose of supplying seeds and plants to those starting new industries, and to furnish them with selected fruit trees, such as grafted oranges, grape-fruit, mangoes, &c. These would not be obtainable by any other means. The men in charge of such branch establishments should be competent to advise as to the selection and treatment of soils, and afford hints in regard to the requirements of new or little known plants. Later on one or two agricultural instructors might be added to the staff, and these would devote themselves, as in Jamaica, to the work of visiting and instructing settlers, and giving practical demonstrations in grafting and pruning orange and other fruit trees, coffee, and cacao, and in simple and inexpensive methods of preparing crops for market. The progress made under the stimulating influence of such agencies would soon repay the cost. There is ample evidence of this in the rapid development of new industries which has taken place in other countries.

Gold Industry.

86. The discovery of the Caratal goldfields in Venezuela, in 1856, led to the search for gold in British Guiana. The first attempts failed, and it was not until 1880 that placer washing was successful in the Parani river, a branch of the Mazaruni. In 1884 regulations were issued by Government, and a royalty of 5 per cent. was imposed on the gold obtained, which amounted in that year to 250 ounces. Since that time considerable progress has been made. The value of the gold exported during the last six years has been as follows :—

Year.	Value.	Year.	Value.
	£		£
1890...	235,093	1893...	511,363
1891...	376,385	1894...	506,446
1892...	494,551	1895...	449,876

87. Most of the capital has been provided locally ; only two or three companies are supported by outside capital. The gold diggings are in the heart of the forest, and in many cases at a considerable distance from the coast. Two or three weeks are often occupied in reaching them, and in consequence the expenses are heavy. So far, the gold has been obtained by placer washing, and mining for gold has only just been started. Mr. George Garnett stated in February last : "The first really successful quartz "mine has only been running six months. Another started to "crush a fortnight ago. It remains to be seen whether they are "successful. Labourers are paid 32 to 48 cents per day, and "rations (the latter costing about 32 cents per day), and are "under engagements generally for three months at a time. They "are almost entirely negroes. Coolies are unable to do the heavy "digging and shovelling required."

88. During 1891 about 20,000 labourers were registered in the gold districts, these serving, on an average, about three months each, so that there were always about 4,000 or 5,000 diggers in the bush. The number registered in 1895–96 for gold-mining purposes was 17,638. It is probable that the total number directly and indirectly concerned in the gold industry is not much below 30,000 souls. Mr. J. H. de Jonge is of opinion that labour in the goldfields is more profitable to the Colony—not necessarily to the individual employer—than any other industry. He estimates that 6,000 men engaged in washing gold "have produced a net "result of 480,000*l*., whereas in the sugar industry they would "only have produced 48,000*l*." The energy employed in the case of gold has, according to this witness, been ten times more profitable than in the case of sugar.

89. According to one witness it is the royalty received for gold which has enabled the Government, so far, to supply better means of communication with the interior. Should the gold industry be further increased it is probable that settlements will be established

to supply the mining camps with provisions. By these means a gradual settling of the Crown lands in the interior might be started.

90. The gold industry brings in by fees, licences, and royalty a revenue of about 25,000*l.* annually. It is indispensable that better communication should be established between the coast and the interior, for, until this is done, it will be impossible to become properly acquainted with the gold regions, and assist in their development on systematic lines. At present everything is left to chance explorers. No one with the necessary experience and knowledge of gold mining has been able to devote sufficient time to furnish a reliable report on the capabilities and prospects of the gold industry. Now the sugar industry is in a depressed condition, and it is absolutely necessary to develop other industries, the Government might obtain the services of competent experts, and begin a survey of the most promising gold fields so that their capabilities might be fully ascertained. If the reports proved favourable the ultimate development would follow more rapidly than at present, and the results would prove of value at a time when new sources of income are most required.

Forest Produce.

91. Next to gold the principal forest products are timber, charcoal, guttapercha (balata), indiarubber, resins and various nuts, such as souari and crab nuts.

Timber.—The principal commercial timbers of the Colony are greenheart, mora, wallaba, bullet wood, letter wood, &c. The most valuable is the greenheart, known also as the bibiru (*Nectandra Rodiæi*). This tree (one of the laurels) is widely distributed on rocky soils along the banks of the Essequebo, Mazaruni, and Cuyuni rivers, but not extending more than about 100 miles inland from the coast. The bark yields a valuable tonic medicine, biberia. The timber is very hard and durable, and is specially valuable in the construction of canals, wharves, dock gates, and in shipbuilding. It withstands the attacks of the teredo and lasts longer than any other timber under water. According to Mr. McTurk, greenheart in British Guiana has been practically exhausted in the area below the falls, "but above there are millions of cubic feet that have never been touched by the axe." These are protected to the extent that those squaring less than 12 inches are not now allowed to be cut. The total export of timber is about 16,000*l.* annually.

92. Wallaba is the next most valuable timber. It is exported in the form of shingles for roofs, charcoal and staves. Charcoal is exported to the value of 10,000*l.* annually. The indiscriminate cutting of wood for charcoal-making is regarded as very injurious to the forests of the Colony. Although regulated by the issue of licences, further restrictions are evidently necessary to preserve valuable trees in certain districts.

93. Mora (*Dimorphandra Mora*) is found growing gregariously in rather swampy ground. It is a large tree, yielding a timber

used locally for railway sleepers and in shipbuilding. The bullet tree yields not only a hard and very durable timber, but also the local guttapercha, known as balata. The timber, one of the hardest and densest in the Colony, is too heavy to float, and it is exported only to a slight extent.

94. *Balata.*—This is obtained by coagulation from the milky juice of the bullet tree (*Mimusops globosa*). [It is really inferior in quality to true guttapercha, which is the produce of an East Indian tree (*Dichopsis Gutta*). If the milk were kept pure and prepared differently the product might be improved.] The supply is, however, somewhat limited, and hence it is not so extensively known as the ordinary guttapercha.

95. The headquarters of the Balata industry are in Berbice, the trees being abundant in certain localities on low lands bordering the Berbice, Canje and the Corentyne rivers. The local distribution is, however, unequal and variable. The trees are also found in the western parts of the Colony in tracts on the Pomeroon, Waini, and the upper reaches of the Cuyuni rivers. The yield per tree varies a good deal, not only in regard to size, but also the seasons of the year. The largest trees may yield as much as 12 to 20 pounds of balata, whereas a young tree a foot in diameter will yield only about four or five pounds. In collecting balata the tree is often cut down, and the timber, which is valuable, is sacrificed merely for "the juice contained in the bark." As the interior of the Colony is opened up, this timber would be accessible and capable of being exported. Latterly the Government has issued regulations which have tended to restrain the reckless cutting down of bullet trees. Grants are limited to a frontage of four miles on a creek or river. This necessarily limits the area to about 20 square miles, for the bleeders do not care to go many miles in, as they almost invariably bring out their milk to the riverside to sun or air dry it. A number of grants of the same size can be taken out together, or in other parts of the country by one person.

96. *Rubber.*—There are probably several species of trees yielding indiarubber to be found in the Guiana forests. One, the Hatie (*Hevea spruceana*) is closely allied to the tree yielding the Para rubber of commerce, the most important caoutchouc tree now existing. The Hatie is found in the upper basin of the Essequebo and Mazaruni rivers, and probably yields some of the crude rubber sometimes received from that region. It is also found in some districts on the Pomeroon river. Mr. Jenman calculates that from a large tree several pounds of rubber might be produced. The milk of a tree or trees known as "Touckpong" or "Cumakaballi" is sometimes mixed with balata milk, but it is not separately prepared. A specimen of rubber obtained by Mr. Jenman from a large twining plant known locally as "Macwarrieballi," and determined to be *Forsteronia gracilis* was received at Kew in 1888. It was shown that if the plant from which this rubber was prepared existed in any quantity in the interior of the Colony, the collection of the rubber would be a very promising commercial undertaking (*Kew Bulletin*, 1888, pp. 69–71).

97. It is very desirable that all these rubber trees should be carefully and exhaustively investigated in order to find out their true value. It is probable that it may be found profitable to establish natural plantations in districts where the best rubber trees are already found. This could be done with little difficulty, and it offers the best means of immediately extending the area under rubber trees in different parts of the Colony. Where plants are plentiful it would only be necessary to clear away some of the other vegetation and allow the rubber trees more light and air, as well as thinning them out when too crowded. Where the conditions are favourable, and the plants only sparsely found, wild seedlings might be transplanted or fresh seeds "dibbled in" at intervals to fill the vacant places. The cost of this plan would not be considerable, as the trees would require little attention after they are well started.

98. The forest lands at present yield a yearly revenue of about 48,000*l.* made up of "acre money," royalty on timber, shingles, charcoal, balata, and gums. Considering the vast extent of the forest region of the Colony this is a trifling sum, and probably nearly all of it is absorbed in the cost of collection. These forests, rightly controlled, should constitute an important source of wealth to the Colony. Owing to the difficulty of reaching the region above the falls, the forests below have been cut over several times and the best timber removed. In some localities firewood cutters and charcoal burners are destroying valuable timber and preventing the growth of young saplings. The time has arrived when the Government might take in hand an investigation of its forest resources and employ a competent forest officer from India or elsewhere to advise as to the best means of regulating and developing them. The Guiana forests are the most valuable of any in the West Indian Colonies. Hitherto they have only been partially protected and it is evident that they are in danger, at least in the most accessible districts, of being seriously injured. The vast regions above the falls are safe only from their inaccessibility. If suitable means of reaching them could be devised, and the cutting carried on under proper regulations, they would be capable of supplying valuable timber and contribute largely to the wealth of the Colony.

III.—BARBADOS.

99. Barbados is the most easterly of the West India Islands, and faces the trade wind sweeping over the Atlantic. It is a little larger than the Isle of Wight, and contains 166 square miles or 106,470 acres. The land rises in gentle slopes or terraces from the sea to an elevation of about 1,000 feet. The highest point is Mount Hillaby, 1,145 feet. The conformation of the surface renders every part suitable for cultivation. Only 6,470 acres, or 6 per cent., are returned as rocky or useless land, and 66 acres are in forest and brushwood, representing the original vegetation of the island. Practically all the land is owned privately. There are no Crown or Colony lands. Excellent roads render every part of the island accessible. The climate is remarkably healthy.

100. Barbados was settled in 1625, and has always remained in the possession of Great Britain. It has been carefully cultivated, and the cane fields and pasture lands have the appearance of a well-kept garden. Even in the seventeenth century it was described as "the most populous, rich, and industrious spot on the earth." It has maintained its character of being both populous and industrious to the present day. The present population is estimated at 186,000, or 1,120 to the square mile; about 17,000 (or less than 10 per cent.) are white; the remainder are coloured and black. The natural increase of the native population has always rendered coolie or any other immigration unnecessary.

Sugar Industry.

101. For the last 200 years the sugar cane has been extensively cultivated in Barbados. The present area under cultivation in sugar-cane is 74,000 acres, equal to 70 per cent. of the total area of the island. The portion of the population directly employed in the sugar industry (in 1891) was 47,045, or 25·8 per cent. of the total population. The approximate estimate of capital invested in properties now existing is about two millions sterling. The number of sugar estates is 140, with an average area of 168 acres. There are 23 with an actual area over 500 acres, and 139 with less than 100 acres. The sugar estates, the proprietors of which do not reside in the Colony, number 150, with an area of 48,550 acres, or a little more than two-thirds of the total area under cane cultivation; 19 estates with a total area of 6,707 are owned by public companies.

102. The cultivation on the estates in Barbados is carried on in a most careful and systematic manner. The soil is naturally fertile, and it has borne regular crops of canes for a longer period than possibly any other part of the world. The soil is treated with artificial and other manures, and its capacity for yielding sugar cane is still as good as that of any other country. The total value of the artificial manures used in the island during the ten years 1886–95 is estimated at 696,886*l.*, or an average of 69,889*l.* per annum. The cost of the very considerable amount of farmyard and other similar manures is not included in this amount. Canes are usually planted annually, but on the higher lands they are often "ratooned," and thus give rise to crops without annual plantings.

103. In the crushing of the canes, 99 only of the estates use steam power. The remaining 341 are dependent on wind power. Two classes of sugar are produced :—(1) raw, or muscovado, sugar, and (2) centrifugal sugar. Muscovado sugar is produced by 432 estates, containing 94 per cent. of the total area, while centrifugal sugar is produced on eight estates, containing 6 per cent. of the total area. Rum is distilled on four estates. The cost of producing rum is given at 3*d.* per gallon exclusive of the value of the molasses used.

104. The exports of sugar from Barbados average about 50,000 tons per annum. Although the quantity produced has not materially decreased of late years (except in 1895, when there was a short crop, owing to unfavourable seasons and disease), the value has fallen very considerably. For instance, the collective export value of sugar, rum, and molasses in 1884 reached a maximum of 1,113,938*l.* ; in 1890 it was 1,040,720*l.*, while only six years later (in 1896) it had fallen to 577,367*l.*

Sugar, rum, and molasses constitute the principal items of export, and represent in fact 97 to 98 per cent. of the total exports of the produce of the Colony. Barbados is, therefore, wholly dependent on the cultivation of the sugar-cane.

105. In 1882 60 per cent. of the sugar produced in the island was shipped to the United Kingdom, the remainder going to the United States (17 per cent.) and Canada (22 per cent.). In 1896 5 per cent. only was shipped to the United Kingdom, 93 per cent. to the United States, and only 2 per cent to Canada.

106. The bulk of the Barbados sugar is therefore shipped to the United States, and this in spite of a duty of 40 per cent. *ad valorem* placed upon it in that market. It is almost entirely used for refinery purposes. Under present circumstances there is no other market for muscovado sugar, and if this were lost the industry would be in a still more precarious condition.

107. Particulars respecting the average cost of producing a ton of muscovado sugar are elsewhere given. Briefly, it may be stated that the cost of production of a ton of ordinary Barbados sugar is 9*l.* 16*s.* 2*d.*, less 1*l.* 4*s.* per ton received for provisions, live stock, &c. This makes the net cost 8*l.* 12*s.* 2*d.* As the current price of muscovado sugar in February last was £8 8*s.* per ton, the loss on every ton of sugar produced in Barbados was 4*s.* 2*d.* per ton.

108. The close relation which exists between the amount of the rainfall and the yield of crops in Barbados is shown in the following table :

Decades.	Average rainfall for the 10 Years.	Average Crop for the 10 Years.
1850 to 1859	59·19	41·516
1860 to 1869	58·39	46·605
1870 to 1879	59·70	46·985
1880 to 1889	65·47	59·620

109. Owing to the imperfect crushing of the canes in the present mills, and the somewhat crude methods of manufacturing the sugar, there is a considerable loss incurred on nearly all the estates in Barbados. According to careful estimates prepared by the Analytical Chemist and the Superintendent of the Botanical Station, and based on experiments extending over seven years, it is stated that there is "an average loss of over 2,000 pounds of "sugar per acre left in the canes after crushing, which is burnt in "the megass." They add: "A large part of this could have "been recovered by more perfect crushing." This may be expressed in another way. In consequence of imperfect extraction, it now requires 13·6 tons of cane to produce one ton of sugar. With the best machinery 9·5 tons of cane would be sufficient to produce a ton of sugar. The manufacture, according to Professor D'Albuquerque, is equally defective. He states: "For every "100 pounds sucrose (crystallisable sugar) contained in the juice "not more than an average of 75 pounds of ordinary muscovado "sugar is recovered." There is, therefore, a loss, owing to imperfect manufacture, of 25 tons of sugar in every 100 tons contained in the juice extracted.

110. There are reasonable grounds for believing that, if central factories could be established in Barbados, the sugar industry would have a chance of becoming more prosperous. Professor Harrison, after a detailed series of experiments, finally arrives at the following striking conclusions in favour of central factories: "With the average Barbados canes containing 14·5 per cent. of "sucrose, the gain in value of the products would be approxi-"mately 10*s.* 9*d.* per ton of canes. From this must be deducted "the interest on capital, the depreciation of the machinery, and "extra cost of manufacture, which I estimate would amount to "5*s.* 9*d.* per ton of canes, thus leaving a gain of 5*s.* per ton of "canes, by the working up of canes of average richness in a "central factory producing refining crystals. The yield of canes "per acre in Barbados in fairly favourable seasons may be "estimated at 25 tons, and the gain per acre by the adoption of "the central factory system, at the present range of prices, would "amount to £6 5*s.*"

111. According to this statement, if only one half of the area of existing estates were to adopt the central factory system, the total increased value of the sugar produced would amount to nearly a quarter of a million sterling.

112. The grouping of the estates and the working of the central factories should be left to be worked out by the proprietors themselves. If the factories were carried on to the general advantage of those who supply the canes, and not of outside capitalists, there would be less opposition to the grouping of the estates, and the benefits of the scheme would be more widely felt. Practically all that is necessary is to place within reach of the planters sufficient capital at a low rate of interest to establish two or three well-equipped central factories supervised by thoroughly experienced and capable men, including a good chemist. The cultivation, if kept to the standard already attained in Barbados, would always result in canes of high saccharine quality, while the level character of the

country making it convenient for the construction of tram lines, with the excellent roads already existing, should enable the canes to be delivered at the factory at a comparatively low cost. Probably nowhere else in the West Indies, except possibly in Antigua, could sugar be produced at so low a cost as in Barbados.

113. Amongst the better class of black people cane farming might eventually become an important means of utilising the energies of those who will not work for daily wages on the sugar estates. This class could raise canes by the labour of themselves and their families more cheaply than the estates, and it would be to the general advantage of the community to encourage cane farming, as thereby the area under cultivation would possibly be increased, and a class of labour not otherwise productive would be contributing to the wealth of the Colony.

114. In aid of the sugar industry valuable work has been carried on by the former and present island professors of chemistry (Messrs. Harrison and D'Albuquerque), and Mr. J. R. Bovell, the Superintendent of the Botanic Station at Dodds. These investigations have been directed to: (1) the effect of manures; (2) the comparative value of already existing varieties of the sugar-cane; (3) the raising of new varieties of sugar-cane from seed, and an examination of their value as compared with existing varieties; (4) investigation of cane diseases. Annual reports have been published since 1886 containing details and summarising the results for the information of planters.

115. In 1888 it was shown at the Dodds Botanic Station to be possible in a systematic manner to raise canes from seed, and advantage has been taken of this every year to produce seedlings differing from all known varieties. These are multiplied by propagation from cuttings, and the more promising ones are planted in plots and reaped and analysed. The results have shown that seedlings can be raised giving a heavy yield per acre and juice of high quality; that when certain seedlings are cultivated side by side with the Bourbon, and as nearly as possible under like conditions, they compare very favourably both in yield and quality with that variety, and that they are in many cases far less liable to fungoid disease. These results therefore point to the possibility of raising a seedling cane with high disease-resisting power, and one which by cultivation and selection will give increased yield upon the Bourbon cane. Whenever the quality of seedlings raised elsewhere has warranted it, specimens have been procured from other stations. The station also has supplied seedlings to various parts of the world.

Botanic Station.

[The Botanic Station is attached to the boys' reformatory school at Dodds, and the labour of the inmates is utilised to cultivate about 90 acres of land chiefly in sugar-canes. The idea of establishing a Botanic Station here was due to Sir William Robinson when he was Governor of the Windward Islands in 1887. Numerous varieties of canes were obtained from Jamaica and elsewhere, and, in conjunction with Professor Harrison.

Mr. Bovell, the Superintendent, undertook and carried out a very valuable series of cultural experiments to determine the best varieties of canes suitable for the circumstances of Barbados. After this the scope of the experiments was enlarged, and the effect of artificial and other manures on the growth and yield of canes was carefully followed. The results of these investigations were published in annual reports prepared by Professor Harrison and Mr. Bovell. After Professor Harrison's removal to British Guiana, the experiments at Barbadoes were continued by his successor, Professor D'Albuquerque, still with the valuable cultural assistance afforded by Mr. Bovell.

The observations and investigations carried on at the Barbados Botanical Station are generally acknowledged to be of the highest value to the staple industry of the island. The facts so far obtained show that a good deal more is possible to be done to improve the yield of canes. In fact, it is surprising that systematic efforts were not made long ago to establish experimental stations in the West Indies, for the special purpose of doing for the sugar-cane what has been so successfully accomplished in European countries in regard to the beet.

Besides the experiments in sugar-cane, steps have been taken at the Dodds Botanical Station to cultivate other plants, especially species of *Agave*, *Furcraea*, *Sansevieria*, *Bahmeria*, for fibre purposes. The present land is, however, too clayey for such plants, and also too much exposed to strong and dry winds. While it has answered very well, up to a certain point, for useful experiments in regard to sugar-cane, the site at Dodds is quite unsuitable for the cultivation of other plants. The wind is most injurious to them, and during certain seasons of the year there is little or no water available for purposes of cultivation. It would be of considerable advantage in the interests of the sugar industry, as well as of others, to possess an experimental station in another part of the island.

If such a second station were established, it is possible that land might be found well suited for the cultivation of many plants likely to prove of great value to Barbados. The island is now so entirely dependent on sugar, that it is very desirable to encourage, as far as possible, any measure calculated to improve and establish it. It is also equally important to support it by other and subsidiary industries. There are still large areas of waste land in Barbados where a fibre industry might be successfully established, and also other lands where plants yielding tanning barks might be cultivated. These cannot be experimentally tried at Dodds owing to the unsuitability of of the soil and the exposed character of the situation.

The following may be usefully consulted in regard to the economic resources of Barbados :—

Hughes, Griffith. The Natural History of the Barbados. In ten books. London, 1750. Folio. pp. 314, tt. 29. Botany, pp. 97–256.

Maycock, J. D. Flora Barbadensis. London, 1830. 8vo. with a geological map.

Schomburgk, Robert. History of Barbados. London, 1848. 8vo. (Flora, pp. 573–633).

Harrison, J. B., and Bovell, J. R. Reports of the results obtained (with sugar cane cultivation) in the Experimental Fields at Dodds Reformatory for the years 1886, 1887, 1888 and 1889.

Bovell, J. R. Report of Results obtained on the Experimental Fields at Dodds Reformatory for the years 1890, 1891.

D'Albuquerque, J. P., and Bovell, J. R. Reports on the Experimental Fields at Dodds Reformatory for the years 1892, 1893, 1894, 1895 and 1896.

To assist in starting subsidiary industries in Barbados, Mr. Bovell has issued the following *Bulletins* :—

(1.) "Mauritius and other Fibre plants," 1891.

(2.) "Canning and Preserving Fruits and Vegetables," 1891.

(3.) "Cultivation of Wattles and Wattle-barks for tanning purposes," 1892.

(4.) "Report on the Fungus attacking Sugar Canes in the West Indies," 1893.

(5.) "The Cultivation and Manufacture of Arrowroot," 1895.

(6.) "On Stock foods and how to use them," 1895.

(7.) "Observations on the Agricultural Chemistry of the Sugar Cane," (Phipson) 1896.]

116. Since the end of 1890, disease of the sugar-cane caused by the fungus (*Trichosphæria Sacchari*) has attacked the growing crops, rendering it impossible on many estates to continue the cultivation of the Bourbon cane. The most effective means of combating it so far, has proved to be the planting of varieties other than Bourbon and "seedling varieties," together with exercising great care in selecting healthy plants and destroying all refuse of diseased canes. The greater part of the island is now planted in such varieties, and disease is much less prevalent.

[Full information respecting the various diseases affecting sugar-cane in the West Indies is contained in the pages of the *Kew Bulletin*. The rind disease was described in *Kew Bulletin*, 1893, p. 149. What was known as the root disease was discussed in *Kew Bulletin*, 1893, p. 347. These are probably different forms of one and the same disease. An account of the general treatment of fungoid and insect pests injurious to sugar-cane was published in *Kew Bulletin*, 1894, p. 167 ; while an article entitled "Sugar-cane disease in Barbados" appeared in *Kew Bulletin*, 1895, pp. 81–88. In this latter is given full information in regard to the local treatment of diseases of the sugar-cane.]

118. The Barbados Agricultural Society has existed since 1845. It receives a grant from Government of 150*l*. towards prizes at exhibitions for agricultural produce. It holds monthly meetings, and it has initiated many movements favourably affecting the

agriculture of the Colony. The Analytical Committee of this society supervises the carrying out of the Fertilisers and Feeding Stuffs Acts. It procures samples of nearly all the manures and oilmeals sold in the Colony, for analysis and valuation by the Government chemist. By these means a high standard of purity in these articles is maintained in the island.

Industries other than Sugar.

119. While sugar is the staple industry of the island, other industries are carried on to some extent. Fresh vegetables, such as sweet potatos and yams, are grown as rotation crops on the sugar estates. These are estimated to yield a return equivalent to 1*l*. on every ton of sugar produced. On this basis the total value of these bye-products would be about 50,000*l*. annually. The sweet potatos and yams are largely consumed locally, and furnish the principal food of the labouring classes. They are also exported to Trinidad and Demerara. The value of the exports in 1896 was 6,291*l*. Maize and guinea corn are also grown, but not nearly to the extent of supplying local requirements. Tamarinds, the fruit of the Indian tamarind, are produced abundantly in the island, and after being preserved in hot syrup are exported chiefly to the United Kingdom. The value in 1896 was 1,230*l*.; in 1885 it was 2,407*l*. Barbados aloes, prepared by boiling the juice of the common aloe, has formed a small but interesting local industry. The quantity exported depends on the state of the market abroad. It is never very large. Latterly ice has been manufactured for export to the neighbouring colonies. The value shipped in 1896 was 1,574*l*.

120. Efforts are being made to develop an industry in connection with the deposits of "manjack," or glance pitch, found in the interior of the island. The exports in 1896 were 878 tons, of the value of 1,756*l*.

121. The fisheries of Barbados are described in a very interesting report prepared by Captain F. R. Barton, A.D.C. It is estimated that 1,500 persons obtain their living thereby, and that the annual value of the fish caught is about 17,000*l*. sterling. The most important food fish is the flying fish, in appearance like the herring, and swimming in shoals. The season lasts for seven months. After exceptionally large catches the fish become exceedingly cheap, selling for about five or six pounds for a penny. The roe of the sea-egg or sea urchin (*Echinus*) also forms a rich and nutritious food. The sea-eggs are obtained by diving in four to six fathoms of water. Besides those above mentioned several large fish, such as snapper, grouper, and other kinds, are taken by deep line-fishing, and lobsters and crayfish along the shore. The fisheries deserve to be carefully examined, with the view of rendering them of greater value to the island. It is possible that the flying fish could be preserved either in salt or oil for exportation, and that with more suitable appliances the supply of large fish could be greatly increased. At present, dried or salted fish is imported for local consumption to the value of about 20,000*l*. annually.

122. Returning to a consideration of agricultural industries, it may be pointed out that the physical conformation of the island, with its open expanses gently sloping towards the sea, and the prevalence of strong trade winds, render it unsuitable to the cultivation of many tropical plants. Besides the want of shelter the soil is often stiff and clayey, requiring considerable labour and expense in its preparation. Some experiments have lately been tried to grow oranges, grape-fruit, and coffee in enclosed situations, similar to the walled-in gardens of the Canaries. This plan will probably succeed but only to a limited extent. The fruit trees are grafted and carefully cultivated, and the produce should find a ready market locally and amongst the shipping at Bridgetown. The coffee produced is of good quality, in spite of the low elevation at which it is grown. At present it is sold in the island, in bags of five pounds each, at 1*s.* per pound.

123. On the waste lands in the interior Wattles (species of *Acacia*) might be grown for the bark, which yields a considerable percentage of tannin. There was an opening a few years ago for growing plants yielding white-rope fibres; the prices now are not so encouraging as they were in 1889-91, but are still good.

124. The cultivation of grasses for fodder purposes is systematically carried on, but there is still room for larger areas, especially by means of irrigation. As showing the profits arising from the latter, it is recorded that 40 acres of Para grass, well manured and irrigated, have yielded in good years cut grass of the annual value of 600*l.* The feeding of cattle for milk and food purposes with this and similar grasses might be considerably extended. The "sour grass" of Barbados is a hardy and excellent pasture grass that thrives in the driest and most exposed places. It supplies valuable food for horses and cattle when other fodder is scarce. The "hay grass" is found principally on low-lying lands near the sea; it yields excellent grazing during the rainy season. These pasture grasses also might be further extended and cultivated, so as to support a larger number of cattle and horses.

125. In the event of any new industry arising capable of being established in the island, valuable assistance could at once be afforded by the Botanic Station at Dodds.

IV.—TRINIDAD.

126. Although less than one-half the size of Jamaica, Trinidad is a rich and productive island. It was for many years the most prosperous in the West Indies. To it in 1889 was joined the island of Tobago, which in this report is treated separately. Trinidad contains 1,754 square miles, and lies about 16 miles eastward of Venezuela, opposite the delta of the Orinoco. The northern mouths of this river empty themselves into the Gulf of Paria, a land-locked sea between Trinidad and the mainland. The north coast is rockbound through its whole extent, the east coast is so exposed to the surf from the Atlantic as to be almost unapproachable, while the south coast is steep in most parts; on the west coast only are there suitable shipping ports. The high lands run in three almost parallel ranges from east to west. The most northerly fringes the north coast, and rises in Tucuche to 3,000 feet; the central range runs obliquely across the island to San Fernando, while the southern runs parallel and near to the south coast. The country between these ranges is hilly or undulating, and admirably adapted for purposes of cultivation. There are many small and somewhat sluggish rivers, all running either east or west.

127. The soil is varied, extremely fertile, and capable of producing large crops of sugar, cacao, and, indeed, all tropical staples. The island lies outside the hurricane region, and is safe from its destructive influence. The climate is somewhat damp and enervating in the hot season, but in winter is usually healthy and pleasant. The mean maximum temperature is 86°, the mean minimum 69°, while the mean annual is 79°. The average annual rainfall for 30 years, published by Mr. Hart, is 66 inches; the average for the last four, 1892–96, was 75 inches. In a very dry year, as in 1873, the rainfall may be as low as 44 inches, while in an exceptionally wet year it has been as high as 87 inches.

128. The capital of the island is Port of Spain, with a population, in 1891, of 33,273. This is situated on a gentle slope overlooking the Gulf of Paria. It is an important town, with handsome public buildings; it is lighted with electric light, and possesses seven miles of tramways and 450 miles of telephone wires. Other incorporated towns are San Fernando, with a population of 6,570, and Arima, 3,653. The population of the island in 1891 was 200,028, or 46,900 more than in 1881, and nearly double what it was in 1871. The present estimated population is 230,000, or 131 to the square mile. It is composed of English, German, French, Spanish, and a large proportion, more than two-fifths, of East Indian or coolie immigrants. The number of immigrants introduced since immigration commenced in 1845 is 105,226, and the number who have returned is 16,024. The estimated number now in the island is 83,000.

129. The total area of the island is 1,120,000 acres, of which 320,000 acres is estimated to be the area of swamps and of rocky and other useless land. The estimated area of cultivable land is 800,000 acres, or 71 per cent. of the total area. Of this area there were in private hands on the 31st December, 1895, 433,843 acres.

and in that of the Crown 366,157 acres. Nearly all the unalienated cultivable lands are either in natural savannahs or covered with high wood. The actual area under forest is not known, nor, owing to the tax on land being now levied at a uniform rate on all lands, is it known what area is beneficially occupied by cultivation, or what proporion this bears to the cultivable area.

130. The principal cultural industries in order of importance are sugar, molasses, rum, cacao, bitters, cocoa-nuts and coffee.

131. The value of the exports of native products and manufactures for the last five years was as follows :—

——	1892.	1893.	1894.	1895.	1896.
	£	£	£	£	£
Sugar, rum, molasses, bitters..	775,877	841,753	675,343	685,550	774,381
Cacao	648,103	530,055	509,808	620,634	452,141
Cocoa-nuts	34,424	32,887	35,063	24,967	26,197
Asphalt	121,631	98,572	112,401	97,375	106,950
Minor products:					
Coffee, fruits, plants, &c. ..	9,073	8,085	4,862	3,800	3,680
Total value of exports ..	1,589,108	1,516,352	1,338,077	1,436,326	1,363,349

Sugar Industry.

132. The sugar industry is undoubtedly the dominant industry in Trinidad, and those engaged in it have practically controlled the destiny of all classes of the community. Sugar is almost exclusively produced on the large extent of level country bordering on the Gulf of Paria, constituting "one of the finest stretches "of sugar land in the West Indies." According to a return attached to a memorandum presented by the joint committee of the Agricultural Society and the Chamber of Commerce, the principal sugar estates in Trinidad have a total area of 66,484 acres ; of this about one half, or 33,805 acres, were actually under canes. The average crop exported from this area was 40,528 tons, or at the rate of 1·2 tons per acre. The number of indentured immigrants employed was 6,838, the number of free resident immigrants was 5,665, giving a total immigrant population of 12,503. The number of resident Creole labourers was 1,559, or not quite 13 per cent. There was in addition a considerable amount of what is described as "outside labour" employed, which may have been supplied either by free immigrants or Creoles.

133. The average total amount paid on these estates in the production of sugar during the years 1894 to 1896 was 448,638*l.*, or a little over 10*l.* per ton. It may be mentioned that none of these figures are conclusive, as apparently they do not represent the whole area under canes. The total production of sugar in 1896 was 59,678 tons, while the above figures relate to estates producing 40,528 tons only. Fifteen estates have been abandoned during the last ten years. The reasons given were (1) four of them were better suited for cocoa-nut cultivation, and cocoa-nuts were, at one time, considered a profitable investment ; (2) four others were in the immediate vicinity of Port of Spain and San Fernando, and it was found more profitable to hire out the land in small lots, (3) the remainder were abandoned because they

produced only raw or muscovado sugar, and were too small to warrant the cost of erecting modern machinery and appliances, or because there was a lack of funds to carry them on.

134. It is estimated that the total amount of capital invested by the present proprietors is about 2,500,000*l.*, of which three-fourths is in machinery and other dead stock required in the manufacture of sugar. From 1885 to 1887 an average crop of 59,774 tons was manufactured on 90 estates. Of these only 14, with an output of 28,500 tons, made vacuum pan sugar, the rest making common process or muscovado sugars. At the present time the same average total crop is manufactured on 39 estates, of which seven only, with an output of about 2,000 tons, make common muscovado sugar; six, with an output of about 5,500 tons, make centrifugal muscovado sugar: while all the remaining estates, 26 in number, make vacuum pan sugar. It may be accepted, therefore, that on the sugar estates in Trinidad, with very few exceptions, "advantage has been taken of the most "modern improvements in boilers, furnaces, multiple evaporators, "crushing mills, and other machinery, and that most of the estates "are now fully equipped for producing the best qualities of sugar at the cheapest possible rates."

135. Trinidad makes a large quantity of sugar known as "yellow crystals," which goes into direct consumption in this country, and for which a higher price is paid than for refining sugar.

136. The value of the various qualities of sugar exported during the last six years is as follows :—

——	1891.	1892.	1893.	1894.	1895.	1896.
	£	£	£	£	£	£
Muscovado	234,239	164,120	157,296	96,389	46,002	35,509
Centrifugal	143,348	118,717	491,759	343,989	165,722	293,177
Vacuum Pan	285,202	392,505	108,882	157,632	384,691	371,661
Total	662,789	675,342	757,937	598,010	596,415	700,347

137. It will be noticed that the value of common muscovado sugar has decreased from 234,239*l.* in 1891 to 35,509*l.* in 1896, while the value of vacuum pan, or factory sugar of a higher class, has increased from 285,202*l.* in 1891 to 371,661*l.* in 1896.

138. The principal markets for Trinidad sugars are in the United Kingdom and the United States. More than one half, or 29,333 tons out of a total crop of 54,720 tons, was shipped to the United Kingdom in 1895. The quantity shipped to the United States was 24,750 tons; to all other countries 637 tons.

139. Very little information is available in regard to the character of the cultivation and the system of manuring followed on Trinidad estates. There is no agricultural chemist actively engaged in assisting the planters in field work as in British Guiana, Barbados, and Antigua. The experiments hitherto carried on with new varieties, and in testing the saccharine qualities of canes proposed to be distributed in the island, have so far been undertaken by the superintendent of the Botanic Gardens, acting in co-operation with a sub-committee of the Agricultural Society.

A second report from this body was presented in April last. Some of the canes under trial are stated to be promising, and it is believed that the work done "will be of considerable future value." The root and rind fungus has been prevalent among the cane fields, and cane-borers and root-destroying grubs have caused a certain per-centage of loss, as in other sugar colonies.

140. Although the quantity produced has really increased, the value of the molasses exported from Trinidad has seriously decreased. The annual average value for three quinquennial periods and for the year 1896 is as follows :—

——	1881–85.	1886–90.	1891–95.	1896.
Value of molasses exported ...	£ 59,509	£ 51,560	£ 46,892	£ 36,488

141. It is stated that "the only market of importance for several "years past has been Martinique, where owing to the protective "duties, it could be worked up at a profit." There is some danger that this market will be lost, as it is in contemplation to impose a duty of 100 per cent. on all foreign molasses landed in that island. Formerly good molasses where shipped to the Dominion of Canada, but since the fall in the price of sugar the demand has almost entirely ceased. Vacuum pan molasses, as nearly all the sugar is taken out, are only suitable for being distilled into rum.

142. The value of Trinidad rum in the local market has fallen in 20 years from 2*s.* to 1*s.* 3*d.* per gallon, while in European markets it is barely saleable. In spite of this, the quantity produced has more than doubled during the last five years. The annual average value of the exports for three quinquennial periods is as follows :—

——	1881–85.	1886–90.	1891–95.
Value of rum exported	£ 2,464	£ 3,529	£ 4,587

143. Connected with the local consumption of rum is the manufacture of bitters, an article for which Trinidad has a considerable reputation. These bitters are produced by one firm only, and the nature and proportion of the ingredients used are kept secret. The following is the value of the bitters exported during three quinquennial periods and the year 1896 :—

——	1881–85.	1886–90.	1891–95.	1896.
Value of bitters exported	£ 31,377	£ 40,057	£ 37,663	£ 31,646

144. Cane-farming was started in Trinidad about nine years ago as a means of employment to those who would not work on the sugar estates for wages; or, at least, for the wages offered by the sugar estates. These people generally include the better class of labourers, who readily take up the cultivation of canes on their own or hired land, and are prepared to sell the canes at a fixed sum per ton to the neighbouring factories. The price at present is 9s. per ton. It is believed that by means of this system profitable employment could be found for an important class of agricultural labourers and small proprietors, and that the sugar industry would be greatly benefited. It would undoubtedly be advantageous to keep this labour in the neighbourhood of already established centres, rather than that it should be allowed to drift into the Crown lands, where there are no roads and no facilities for disposing of the produce.

145. Whether cane-farming in Trinidad will become an established industry will depend, of course, in the first place, on a continuance of the present sugar industry, and subsequently on the facilities offered by the factories for bringing in the canes and the prices paid, as compared with the profits actually made on the sugar produced. It is admitted that the cane farmers can produce their canes at a cheaper rate than the estates, but to provide for unfavourable seasons, and allow for an occasional increase in the price of sugar, the arrangements should be elastic enough to fully compensate the farmer for the time and labour devoted to the cultivation of the canes. The greater risk is incurred by the cultivator; once the canes are produced, the manufacture of the sugar is practically assured. The fact that in countries where cane-farming has been carried on for years the factories have prospered, while the cultivators have come to grief, shows how necessary it is that a share of the profits of the factory beyond a certain amount should go to the cane farmer, in addition to the price paid for the canes.

146. During the year 1895 there were 17,502 tons of farmers' canes taken by the factories, while in 1896 the amount had increased to 62,629 tons, or nearly fourfold. It is stated that "unless the factories have to reduce the present prices, the "industry will extend still further . . . it is being taken up "by all classes, both coolie and Creole." The Acting Governor, in a memorandum presented to the Commission, expresses the opinion that "cane-farming will go a long way towards saving "the sugar industry if properly carried out and encouraged," . . . and adds, "I am strongly in favour of a peasant proprie-"tary and small holdings, which are a source of great strength to "the country."

Cacao Industry.

147. Cacao cultivation has been established in Trinidad from its earliest days, and the island is probably more widely known for its cacao than for its sugar. The total area under regular cultivation, according to the Superintendent of Crown Lands, in 1879 was 24,158 acres. The present area is not given, but it must be considerably larger. The majority of the cacao estates are of

small area—from 10 to 50 acres. The value of the cacao exported has steadily risen of late years. In 1881 the exports were of the value of 266,613*l.* In 1895 they had increased to 620,634*l.*, or 24,219*l.* more than the value of the sugar exports for that year. Again, while there has been a net decrease in the value of the sugar exports during the last 20 years of 712,614*l.*, there has been a net increase in the value of the cacao exports for the same period of 1,218,522*l.* As if in sympathy with sugar, the value of cacao during the last two years has greatly declined. Even at present prices, it is admitted that a good, unencumbered cacao estate is a valuable investment. From figures furnished by the cacao planters, it appears that the total amount spent in producing 10,038 bags of cacao was 17,025*l.*, or an average of 1*l.* 14*s.* per bag of 165 pounds. As the exports for 1895 amounted to 158,813 bags, on this assumption the cacao industry is the means of distributing 269,965*l.* annually in the Colony.

148. Many of the large cacao estates now existing have been formed by uniting small areas established under what is known as the contract system. The conditions under which this is worked are well understood by both the proprietor and the contractor. This latter is a labourer, generally French or Spanish. The proprietor agrees to pay the cost of cutting down the forest and to turn over the land, when so cut, to the contractor, who is allowed to cultivate free of rent provisions, such as maize, bananas, plantains, tanniers, pigeon-peas, for a number of years, three to five, according to the quality of the land. In return for the free use of the land, the contractor undertakes to plant it with cacao and shade trees at the proper distance apart, getting his seed or plants from the proprietor, to keep both cacao and shade trees weeded and vacancies supplied, and eventually to give up the land established in cacao on payment at the rate of 1*s.* per tree. The total cost to the proprietor in cutting down the forest and in payment for the cacao trees when fully planted is from 12*l.* to 14*l.* per acre. The system has worked fairly well with intelligent contractors in both Trinidad and Grenada, but its only merit, as compared with plantations regularly established by the proprietors themselves, is its convenience and supposed cheapness. Its drawbacks are (1) the land is largely exhausted by the heavy crops taken off by the contractor; (2) the sorts of cacao planted are often the commoner sorts, as they are hardier, grow larger, and yield a crop or two to the contractor before he gives up the land. The contract system can only be justified by a scarcity of labour and by the existence of a soil so fertile that the cultivation of ground provisions does not seriously exhaust it. When there is a sufficient amount of labour there is no doubt that a good cacao estate could be more efficiently planted, and at a less cost eventually, by the proprietor himself.

149. Returns submitted to the Royal Commission showed that 15 selected estates distributed over the island had an aggregate area of 5,524 acres. The yield in cured cacao on an average of years was given at 8,167 bags, or at the rate of $1\frac{1}{5}$ bags (of 165 pounds each) per acre. In one special case, a large estate containing 357 acres was returned as yielding 1,500 bags per annum, or an average of over four bags per acre. In the case of

Mo. Bot. Garden
1898.

old and neglected estates, the yield was less than one bag per acre. As regards "the cost per bag of producing cacao during the last "three years," the returns showed considerable variation, depending on the quality of the land, the rate of wages, difficulty of transport, and other causes. The lowest cost was returned by an estate of 311 acres, producing 947 bags. This was 1*l.* 6*s.* 3*d.* per bag. The highest, an estate of 227 acres, producing only 100 bags of cacao, was returned at 2*l.* per bag. The average cost for the whole of the 15 estates was at the rate of 1*l.* 15*s.* 10*d.* per bag, or 1*l.* 4*s.* 9*d.* per cwt. In the case of the large estate producing 1,500 bags, the average cost per bag "sold in the London market" was returned at 11 dollars (2*l.* 5*s.* 10*d.*)—or 1*l.* 11*s.* $1\frac{1}{3}$*d.* per cwt.

150. With care in regularly supplying new trees, and constant attention to the cultivation of cacao, Mr. Gannes is of opinion that land planted for 60 years is as good as when it was first cleared. The Hon. Charles Leotaud supported this view, and stated that his family had an estate a hundred years old, still in good order, and yielding large crops.

151. In notes on varieties of commercial cacao, Mr. J. H. Hart, F.L.S., the superintendent of the Botanic Gardens, has drawn the attention of the Agricultural Society to the considerable variation in quality which exists in the cacao shipped from Trinidad, and states that "the higher qualities are in a decided minority." The samples exhibited before the society "appeared to show that there "had been little endeavour . . . to select and grow upon scientific lines the best and high priced forms." Mr. Hart states, "according to my observations, the quality of Trinidad cacao, taken "as a whole, has suffered some deterioration during the past ten years "and if the process goes on it will certainly be a matter of very "serious moment in the near future . . . if then," he continues, "Trinidad cacao is actually declining in quality, and if "it is true that, owing to the prominence of the bitter flavour, "manufacturers are not able to use so much of it as formerly, it "is high time that such work as the improvement of the quality "should be commenced . . . Trinidad should grow generally "a better quality of cacao, and obtain a far better average price "for its produce."

152. The need for a scientific treatment of questions affecting the welfare of the cacao industry is obvious. There is also another point connected with it. In Trinidad, according to the Hon. Mr. Leotaud, there are over 18,000 small peasant proprietors with holdings from 5 up to 20 acres. These cultivate cacao, coffee, fruit, and vegetables. There are besides about 500 people with holdings from 20 to 100 acres. In all the small holdings the people "make very ordinary cacao, selling in the London "market fully 12 to 15 shillings under the best quality." It is probable that an appreciable share of the cacao exported from Trinidad is produced on small holdings. Hence it would be greatly to the advantage of the island to encourage and teach these people to improve the quality of their produce, and save an annual loss that might be estimated at 30,000*l.* Similar systematic instruction might also be given in regard to the cultivation of coffee, fruit, and other subjects.

Cocoa-nuts.

153. The low coast lands of Trinidad have been utilised for the planting of cocoa-nuts on a moderately large scale. The cocal on the east coast stretches for about 18 to 20 miles. Latterly, owing to the low prices, the export of nuts has not been remunerative; and, practically, has remained stationary at about 10 to 12 million nuts annually. Owing probably to the poverty of soil, and the want of suitable manures, Trinidad nuts are smaller than those produced in Central America; and, therefore, command lower prices. In the returns presented to the Royal Commission, seven cocoa-nut estates had an aggregate area of 5,798 acres. The average number of nuts produced by these estates was 5,890,000, or a little more than 1,000 nuts per acre. Cocoa-nuts are sold locally at about 30*s.* to 40*s.* per thousand. These figures show very clearly that at present prices the cocoa-nut industry in Trinidad is not in a flourishing condition.

154. A factory for the manufacture of cocoa-nut oil has lately been established at Port of Spain, with branches on the east coast. There is an import duty of 1*s.* per gallon on oil from abroad. This practically protects the local production. From data supplied to the Commission, it appears that in the five months, from the 1st of August to the 31st of December, 1896, 320,000 nuts were made into oil, costing 33*s.* 4*d.* per thousand. The yield of oil was at the rate of 24·23 gallons per thousand nuts, with 118 lbs. of cocoa-nut meal. The net profit on the oil and meal yielded by 1,000 nuts was 6*s.* 4*d.*, and on 320,000 nuts, 101*l.* 6*s.* 3*d.* Both oil and meal are used locally. The coolie immigrants practically take all the oil for their own consumption. The collector of Customs states: "Cocoa-nut oil has disappeared from the import returns "since the duty was imposed, and the market is now supplied by "local produce."

155. In a paper recently read before the Agricultural Society, Mr. J. H. Hart, F.L.S., the Superintendent of the Botanic Gardens, has shown that it may be more profitable, in some cases, to convert the cocoa-nuts in Trinidad, especially the small and unsaleable nuts, into "copra," a term applied in commerce to the dried kernel, which is largely used in Europe for expressing oil. It is said to contain 54 per cent. of oil, and if dried at 100°, 66 per cent. A large trade exists in this article. It is estimated that at present the planters obtain only 15*s.* per thousand net, after paying freight and expenses, or 90*s.* for 6,000 nuts, the quantity required to produce a ton of copra, worth, say, 12*l.* 10*s.* in the European markets. The expenses for breaking, drying, packing, and freight on a ton of copra, are said to be 3*l.* so that the planter, by converting the nuts into copra, would presumably obtain on 6,000 nuts a net return of 9*l.* 10*s.*, instead of 4*l.* 10*s.* as at present.

Other Subsidiary Industries.

156. As regards other industries likely to be successful in Trinidad, Mr. Hart has prepared a valuable memorandum (Council Paper No. 110 of 1895), which deserves to be carefully studied.

One of the most promising of subsidiary cultivations is that of coffee. Both Liberian and Arabian coffee are already grown in the island to a small extent. Mr. Hart states: "It has been "proved that coffee of first-rate quality can be successfully grown "in Trinidad." Machinery for preparing the produce has been recently introduced, and it has proved to be well suited to both large and small cultivators.

157. Several samples of coffee were shown from Trinidad at the Indian and Colonial Exhibition, 1886. In the report furnished by Mr. Henry Pasteur, it is stated: "There appears to be a good "deal of land in Trinidad for opening into coffee plantations . . . "in an island where the cultivation and preparation of cacao has "been brought to such a high degree of perfection, there ought "to be no lack of skilled labour to prepare coffee much better "than is apparent from the samples exhibited. The shape and "size of the berries show that the soil and climate are favourable, "and that only labour, care, and skill are required to give the "coffee its proper value."

158. Kola is recommended by Mr. Hart to be grown in the same soil and under the same cultural conditions as cacao. The produce is, however, more readily prepared than cacao, and should a considerable demand arise for West India kola it could be largely supplied from Trinidad.

159. Rice can be grown in large quantities, both hill rice and swamp rice. It is estimated that about one-eighth of the quantity consumed in the island is produced locally. The total imports in 1896 were 23,326,715 lbs., so there is a considerable opening for rice-growing amongst the coolie immigrants, who are usually well acquainted with the cultivation.

160. Dhol, or pigeon-pea, dried and split, is largely imported from India. This is a well-known food in the West Indies. The plant is most successfully cultivated in Trinidad, where it is utilised as a rotation crop. The importation from India could, therefore, be dispensed with.

161. There are several other food plants not sufficiently cultivated in Trinidad to supply local requirements. For instance, the bulk of the plantains consumed in Port of Spain and surrounding districts is obtained from the neighbouring coast lands of Venezuela. The total vegetables and fruits imported into the Colony in 1896, according to the Collector of Customs, "were "valued at 30,000*l*., or nearly 3,000*l*. more than in 1895, an "increase of 5,000*l*. occurring in English potatos, chiefly from "Canada. About one-half the vegetables received are indigenous "to the West Indies." Under ordinary circumstances it may be more profitable to devote undivided attention to sugar and cacao, and buy certain articles of food as required, but under present conditions, in so rich and fertile an island as Trinidad, where catch crops are so easily and necessarily grown to afford shade to young cacao, there should be an effort made to produce a sufficient supply of vegetables for all local requirements. It is in evidence that the chief element causing the importation of vegetables is the

want of rapid and cheap communication between the country districts and the principal market at Port of Spain. The railways and roads are said not to be available, or at least not convenient, for the land carriage of such produce, and hence it is brought by the cheaper water carriage from Venezuela and elsewhere. As regards choice fruits, it is probable that, owing to a difference in climate, they are more abundantly produced in Grenada and Tobago than in Trinidad. The same argument cannot, however, be applied to plantains, as these are most abundantly produced locally, and only require a cheap transit to compete successfully with those brought from the Venezuelan coast.

162. Notwithstanding the considerable efforts made to produce tobacco in the island, tobacco and cigars are among the most lucrative articles in the Customs tariff, producing among the imports a revenue of 30,000*l.* to 35,000*l.* per annum. The Collector of Customs states that "there is no sign whatever of any "serious competition from native grown tobacco." One means of extending the cultivation of tobacco would be the immigration of Cubans from the disturbed tobacco districts of Cuba, and settling them on Crown lands of their own selection. If the circumstances of Trinidad were clearly placed before these people, together with the fact that Spanish is spoken by certain members of the community, it is possible that a few families would be willing to settle in the island, and establish a regular tobacco industry. According to the testimony of a Cuban already engaged in tobacco growing in the district of Siparia "there is plenty of land" suitable for tobacco cultivation in his neighbourhood. He makes cigars which are sold locally at one to seven dollars per hundred.

163. Some years ago energetic efforts were made by Sir William Robinson to start a fruit trade between Trinidad and the United States. A subsidy of 5,500*l.* was given to a line of steamships trading between Port of Spain and New York. The first shipments consisted of small lots of fruit, "inferior in size and badly packed," which naturally sold at low prices. It soon became evident that the island at that time had not a sufficient quantity of suitable fruit to maintain a regular trade, and at the end of a few years the attempt was practically abandoned. The principal tropical fruit shipped to the United States is a banana known as the Martinique or Jamaica banana. It is large in size, and of a bright yellow colour. No other banana, however superior in flavour, has any commercial value in America. The bunch usually consists of 7 to 10 bundles or hands. Those with less than seven hands are not saleable. At the time the fruit trade was started in Trinidad this particular banana, called the Gros Michel, was cultivated only to a small extent; in fact, it was scarcely possible to find it in many districts of the island. It was, therefore, impossible to establish a successful trade in bananas until the Gros Michel was cultivated over at least a sufficient area to supply cargo for ships sailing at regular intervals. With the experience gained in Jamaica it is estimated that 100 acres of good land established in bananas will yield (during the second and subsequent years after planting) about 500 bunches per week. Hence, to produce sufficient bananas to give a start to

a fruit trade, it would be necessary to have at least 2,000 acres in good bearing. It would be better to have 4,000 acres, as then the average yield would be about 12,000 bunches weekly. Since 1889 it is stated that more than 40,000 suckers of the Gros Michel banana have been distributed by Government. The position of the island, in case a further attempt were made to start a fruit trade, is therefore greatly improved.

164. The opinion was offered in evidence that Trinidad was too far from New York to carry on a successful trade in fruit. This view was not supported by the experience of Captain Forwood, of Jamaica, who cited the instance of a successful fruit trade established at Santa Martha, a port on the mainland of South America, in almost the same latitude as Trinidad, and at about the same distance from New York. The steamers from Santa Martha generally take from eight and a half to nine days, and they call for mails at Hayti. Captain Forward was of opinion that "with an 11-knot ship the voyage from Trinidad to "New York would last eight and a half days." There has also been introduced a simple method of ventilating fruit ships with air fans worked by steam. These assist in keeping the fruit in good order on longer voyages than heretofore.

165. It would not be desirable in my opinion for the Government to renew the subsidy to fruit steamers until it is satisfied that a sufficient area of land is fully established in bananas to justify such action. The peasants in Trinidad have hitherto been in a comparatively prosperous condition. Probably the profits arising from the cultivation of fruit were not sufficient to attract them. If in the future they show a strong disposition to take up fruit cultivation, it would be well to assist them. The initiative should, however, come from them, and not from the Government. There is apparently no falling off in the demand for bananas in the American market, and the trade is steadily increasing. The profits are less than formerly, but they are as yet sufficiently good to justify action being taken by some of the West Indian Colonies to share in them. There is also the possibility of shipping West Indian fruit to Europe. This subject is more fully dealt with in connection with the fruit trade in Jamaica.

166. Nutmegs have been grown to a moderate extent in Trinidad. "Trees in the Botanic Gardens have yielded crops "valued at 2*l*. per tree annually." Large supplies of seeds have been distributed of late years from the Botanic Gardens. There is room for a moderate development in spices, such as nutmegs, vanilla, and possibly also in cardamoms, especially the large Mysore cardamoms so extensively cultivated in Ceylon. The seeds are in demand by the coolies as a condiment.

167. Tonga beans, used for perfumery purposes, figure very largely amongst the exports from Trinidad. These beans are, however, not produced locally, but are collected in the vast forest region in the basin of the Orinoco. They are brought to Trinidad to be cured by being steeped in rum, and afterwards dried. Last year over 11,000 gallons of Trinidad rum were used for this purpose. Tonga beans in transit were shipped to the United States from Port of Spain in 1896 to the value of 30,000*l*.

168. According to the Customs return, cattle are imported into Trinidad to the value of 35,000*l*. It is probable that most of this large sum is paid for cattle introduced from Venezuela. Cattle raising should become a promising local industry. The Government has maintained for many years a farm where Indian cattle for estate purposes are bred and sold, and the results have proved very satisfactory. If more attention were devoted to laying down and maintaining good pastures throughout the island, it is possible that raising cattle for food purposes would ultimately be the means of supplying all local requirements.

Botanic Gardens.

[The following historical sketch of these Gardens is based on information contained in the Annual Report for 1887 :—

The Royal Botanic Gardens are situated about two miles from the landing place at Port-of-Spain, at an elevation of 130 feet above mean sea level. They are easily approached, either by cab or tram. They form the only pleasure grounds to the Governor's residence, but are open daily to the public, excepting small portions reserved for private use. The Gardens were established in the year 1818, in the time of Sir Ralph Woodford, under the direction of Mr. D. Lockhart (*Kew Bulletin*, 1891, pp. 310–311). Many of the plants were imported from Caracas and St. Vincent, in which island one of the first West Indian Botanic Gardens was started. Mr. Lockhart was Assistant Botanist attached to the ill-fated expedition of Captain Tuckey up the river Congo in 1816, during which he suffered severely and was long a patient in the hospital at Bahia. He visited Venezuela and the countries o the Orinoco, discovering Humbolt's "Cow-tree," *Brosimum utile*, and the Zaman or Saman, *Calliandra Saman*. These, with many kinds of orchids, he introduced into Trinidad. A small but curious orchid has been named after him, *Lockhartia elegans*. It appears that attention was specially given during Mr. Lockhart's time to the introduction and cultivation of the various spice trees.

Under the fostering care of Lord Harris, for many years Governor, the Gardens flourished, and their area was considerably extended. It is said that he annually expended from his private purse a large sum towards their development.

Mr. Purdie, well known from his travels on the mainland, in Jamaica and other West Indian Islands, was successor to Mr. Lockhart. A native of Scotland, he served in the Edinburgh Botanic Garden under Mr. William McNab, and entered the service of Kew in 1841. He was appointed Botanical Collector for that establishment in 1843. In that capacity he visited Jamaica, New Grenada, and other places on the mainland. One of the principal objects of his trip was to introduce the Ivory nut, *Phytelephas macrocarpa*, and other valuable plants, which the late Mr. John Smith, formerly Curator of the Royal Gardens, Kew, states he was quite successful in doing. He returned from his travels by the Magdalena river to Santa Martha, and thence by way of Jamaica and St. Thomas to Trinidad, where, through the recommendation of Sir William Hooker, he was appointed to

succeed Mr. Lockhart in 1846. In 1851 he again visited the mainland, going as far as 700 miles above Angostura. In 1854 he visited Porto Rico, under instructions from the Trinidad Government, to ascertain if there was anything to be learnt from their mode of cultivating and manufacture of sugar. He died in October, 1857, and was buried in the Garden, a column of Scotch granite being erected over his remains.

Grisebach's "Flora of the West Indies" bears ample testimony to the value of Mr. Purdie's labours. He was succeeded by Dr. Cruger, a collector and scientist of no mean repute. In 1864 Mr. Henry Prestoe, who had been trained at Kew, succeeded Dr. Cruger, and during the next 22 years he did much to maintain and increase the reputation of the Gardens. On his retirement in 1886 he was succeeded by the present Superintendent, Mr. J. H. Hart, F.L.S., who had long been connected with the Botanical Department, Jamaica.

The Garden has been in existence for more than 70 years, and is consequently one of the oldest in the West Indies.

The total area is about 63 acres. The Botanic Gardens proper cover 41 acres; nurseries, 8½ acres; Government House grounds, 10 acres; Superintendent's house and garden, 8½ acres.

The residence of the Governor faces south, and is a fine building, erected in 1875, principally of hewn native stone. It overlooks a large savannah of several hundred acres, known as the Queen's Park, which forms a splendid pasture, race-course, and cricket field, &c., beyond is seen the suburbs of the town of Port of Spain. Passing the guard house, which stands close to the public road, the "Palace," as it is called, is approached by a long shady drive, winding under fine specimens of many native trees. To the extreme north of the grounds are the quarters of the Superintendent, while near the nursery grounds are buildings for the accommodation of the members of the staff and for herbarium and officers.

The following particulars of the annual cost of the Trinidad Botanic Gardens are taken from the estimates presented to the Legislative Council in 1896 :—

ROYAL BOTANIC GARDENS.	Approved Estimate for 1895.			Estimate for 1896.		
Personal Emoluments.	£	*s.*	*d.*	£	*s.*	*d.*
Superintendent...	350	0	0	350	0	0*
" allowance as Recorder of Meteorological Observations.	25	0	0	25	0	0†
Assistant Superintendent—£130 to £150... ...	134	3	4	143	6	8*
Clerk—£75 to £100	83	6	8	93	6	8
Foreman (temporary)	100	0	0	100	0	0
Herbarium Assistant	31	5	0	31	5	0
Total Personal Emoluments	723	15	0	742	18	4

Quarters provided. An additional £50 was added to Mr. Hart's salary in 1896.
Temporary allowance to Mr. Hart.

ROYAL BOTANIC GARDENS.	Approved Estimate for 1895.	Estimate for 1826.
Other Charges.	£ s. d.	£ s. d.
Brought forward	723 15 0	742 18 4
Travelling Allowance (Superintendent)	50 0 0	50 0 0
General maintenance of Gardens and Plantations and upkeep of Trees in Queen's Park and Belmont Lands.	640 0 0	640 0 0
Carpenter (temporary)	52 0 0	52 0 0
Watchman ,, ...	52 0 0	52 0 0
Gardeners ,, 12 at £36	432 0 0	432 0 0
Labourers ,, 15 at £22	330 0 0	330 0 0
Purchase of Rain Gauges, Instruments, Office contingencies, &c.	50 0 0	56 0 0
Maintenance of Grounds round Government Buildings.	75 0 0	75 0 0
Seats for Botanic Gardens. &c.	50 0 0	...
Purchase of Horse	...	31 5 0
Total, other charges	1,731 0 0	1,718 5 0
Total, Botanic Gardens	2,454 15 0	2,461 3 4

The following Books and Memoirs contain further information respecting the economic resources of Trinidad :—

Crueger, H. Outline of Flora of Trinidad. London, 1858. 8vo. pp. 27.

Eaton, D. C. Fendler's Ferns of Trinidad : Coulter's *Botanical Gazette*, November, 1878. A list of 114 species.

Harris, C. Alexander. Description of Trinidad. Handbook of West Indies (with list of Exhibits). Indian and Colonial Exhibition. London, 1886. [Contains also (pp. 29–33) the Vernacular and Botanical Names of the Woods of Trinidad, by S. Devenish.]

Jenman, G. S. The Ferns of Trinidad : *Journal of Botany*, 1887. pp. 97–101.

De Verteuil, L. A. A. Trinidad ; its Geography, Natural Resources, Present Condition and Prospects. 2nd edition. London, 1884.

Redhead, J. F. A. Fruits of Trinidad : *Kew Bulletin*, 1888, pp. 191, 192.

Hart, J. H. Report on Forest Conservation. Colonial Office, 1891.

Hart, J. H. *Bulletin*, Botanical Department, Trinidad. 1888–96 (in progress).]

169. The Botanic Gardens in Trinidad at present are amongst the most efficient of any in the Colonies. Mr. Hart, the Superintendent, is an energetic, capable officer, who is devoted to his work. Between the years 1887 and 1896 there were distributed 285,317 economic and other plants, and 123,731 seeds. A large correspondence—about 2,000 letters annually—is carried on in regard to the cultivation of these plants, and a valuable Bulletin is issued regularly containing practical information relating to agricultural subjects. Latterly the free distribution of economic plants by the Government railway has been resumed. The Botanic Gardens in this and other ways have for years encouraged the development of local industries, and if their scope were enlarged in the direction indicated below, there is no doubt they would be capable of rendering still greater services to the island. At present it is evident that too much of the time of the superintendent is occupied in the cultivation and distribution of merely ornamental plants, and in maintaining flower beds and borders around Government House. In consequence, he is unable to take so large a share as is desirable in the more important and urgent duties of promoting the agricultural interests of the Colony. Further, the area of the present garden is too small, and the soil generally too poor, for experimental cultivation of economic plants. It is recommended, therefore, that land be obtained elsewhere for a purely experimental station, where economic plants could be cultivated on a larger scale, and where young men could be trained in agricultural pursuits. At this station also, the trial plots of new varieties of sugar-cane could be established, and a systematic investigation be instituted into their merits, as is done in British Guiana and Barbados.

170. It has been suggested that a portion of the land lately acquired by Government at Diego Martin for waterworks might be devoted to the purposes of an agricultural station. The details of a scheme of this kind need not be given here. It is sufficient to say that a somewhat analogous plan has been found very successful in Jamaica, and there is little doubt, if started on proper lines, it would be equally successful in Trinidad.

171. The cause of failure in starting subsidiary industries in Trinidad, as in all the West Indian Colonies, is due to a want of knowledge of even the simplest elements of horticultural methods. An experiment is often undertaken by men with no experience whatever of the plants they wish to cultivate, but who yet undertake to produce crops requiring great skill and judgment. Such experiments inevitably end in failure. Again, subsidiary industries are only thought of when there is a threatened collapse of the staple industry. At such times there is usually an inconsiderate rush for some industry most in favour at the moment ; prices fall, and the investment is immediately abandoned as unproductive. The failure thus incurred naturally tends to throw discredit on future ventures, and that particular industry is regarded, often undeservedly, as hopeless.

172. Neither in the elementary schools nor in the industrial schools in the Colony is any special instruction given in

agriculture. "Agricultural pursuits are followed," it is said, "at "the Church of England Reformatory, at Diego Martin," but no particulars are given. It is probable that the boys are employed only to raise a portion of their own food. It is desirable that at least theoretical instruction in agriculture be given in the elementary schools, and Readers, such as those lately prepared for the Board of Education in Jamaica, be introduced for that purpose. An instructor in agrienlture could be usefully employed to give lectures to teachers in training and regularly visit country schools in order to encourage agricultural teaching. School gardens might also be started, and a small extra grant given for satisfactory teaching and extra care of gardens.

173. To permanently improve the condition of agriculture attention must be steadily directed to instil better methods of cultivation amongst the people, and to teach them both by precept and example the advantages that arise from care in the selection and preparation of the soil, in the use of suitable manures, in carefully pruning and tending the plants, and in preparing the produce so as to command the highest prices. These remarks apply to old and new industries alike. To improve the methods of cultivating the plants already established, and raise the quality of the produce, would be a most valuable means of immediately improving the condition of the people, and lead eventually to the introduction of many new industries. No systematic attempts have hitherto been made in this direction anywhere except in Jamaica, and the present position of the flourishing industries among the peasants in that island is strong evidence of the value of the practical instruction here indicated.

Crown Lands.

174. The Crown lands of a cultivable character may be estimated at about 300,000 acres. These constitute the most valuable asset of the Colony, and should be judiciously and carefully guarded. A considerable demand appears to be made on the Government to dispose of Crown lands at nominal sums for the purpose of creating a prosperous class of peasant proprietors. This latter is in every way a desirable object, but as the existing Crown lands are for the most part in the interior of the country, and without roads, under present circumstances it would certainly be unwise to dispose of them to the extent suggested. Crown lands are sold in parcels of not less than ten acres, without competition, at 30s. per acre, including fees. Formerly the minimum area was five acres. Payment is required beforehand. There is no system of instalments. The number of grants in 1896 was 407. The land is sold on the understanding that the Government will not be responsible for roads. The primary objects should be to discourage (1) the practice of squatting temporarily on Crown lands, and afterwards abandoning them when exhausted; and (2) the distribution of the population in remote parts removed from control and from suitable markets for their produce. It is probable that if, owing to a decline in the industry, there is a partial abandonment of the sugar lands in the Colony, parcels of

private lands may eventually be brought within reach of small settlers, and these, if accessible by roads and in the neighbourhood of habitations, should relieve undue pressure on Crown lands. It is necessary, also, before further areas of Crown lands are alienated, that certain tracts are defined as reservations for timber purposes to conserve the rainfall, and to prevent injury by destructive floods. In other West Indian Colonies this important matter has been overlooked until too late, and in some it will be necessary, probably at a considerable cost, to buy back lands that ought never to have been alienated. Forest, as is well known, should be carefully preserved on uplands where its destruction would either (*a*) expose the lowlands to injurious winds; or (*b*) where its clearance from the catchment areas of rivers would, by diminishing the natural storage of rain which a forest affords, expose the lowlands to floods in the rainy season or a dearth of water in a dry.

175. From this review of the capabilities and circumstances of Trinidad, it is evident that although the sugar industry is in a critical position, and may eventually be seriously reduced, the resources of the island, if carefully developed, should still maintain it in a condition of comparative prosperity. There should, however, be no delay in organising measures to safeguard the cacao and other industries capable of yielding employment to the labouring classes, and there should also be a vigorous prosecution of efforts to instruct and encourage the people in the cultivation of the land, and in producing articles of high quality for export purposes.

176. Instruction in sound agricultural methods, the opening of lands by roads and railways, frequent and cheap communication with outside markets, aud the investment of capital bearing a moderate rate of interest would find as active a response in Trinidad as in any part of the world.

177. As confirming this view, it may be mentioned that the increase in the net value of the exports of native produce and manufacture shows, according to a memorandum submitted by the Government Statist, that "up to now Trinidad has lost none "of its wonderful powers of development and progress. Notwith-"standing a heavy fall in the price of both cacao, and cocoa-nuts "the increased value of the exports during 15 years has not only "made good a shortage of 506,989*l.* in the exports of the sugar "products, but has added 558,438*l.* to the total, bringing it up "from 6,678,552*l.* at the end of 1885 to 7,236,990*l.* at the end of "1895."

V.—TOBAGO.

178. The island of Tobago comprises an area of 114 square miles, or about four-fifths the size of Barbados. It is 20 miles north-east of Trinidad, with which island it was politically amalgamated in 1888. The surface is generally hilly, with numerous valleys and ravines. The highest ridges attain a height of 2,000 feet. Of the total area (73,313 acres) probably not more than 10,000 are at present under cultivation. It is estimated that there are about 11,000 acres of land, partly in forest and partly cleared, belonging to the Crown. In the original settlement of Tobago there was a reservation made of three chains on the coast line, and also of the highest positions, extending over 6,000 acres, on the main ridge. The latter was made with the expressed object that the effects of the rainfall might not be diminished The average rainfall is 64·20 inches. There are two wet seasons, May and October. The dry months are February, March, and April. The soil is generally rich and fertile, and the island is capable of yielding nearly every kind of tropical produce.

179. The population in 1891 was 18,353 or 161 to the square mile. The portion of the population directly concerned in the sugar industry is returned at 5,000, or 27 per cent. This is probably in excess of the actual number, as the total value of the sugar, rum, and molasses exported in 1896 was only 5,109*l*. The climate is described by the Chief Medical Officer as "one of the healthiest in the topics."

Sugar Industry.

180. In 1862 there were 65 sugar estates existing in the island At the present time they are reduced to 38, not one-half of which employ steam power. The estimated area under sugar is 2,000 acres, or 20 per cent. of the whole cultivated area. Most of the present estates are, however, only nominally in cultivation. "The "cultivation of sugar is carried on solely on the metayer system; "the owner of the estate supplying the land on which the canes "are grown, carts, stock, and the works and machinery necessary "for making the sugar, while the metayer supplies the labour and "conducts the agricultural operations of growing and carting the "canes. The sugar made is divided into halves, one for the "metayer and one for the estate owner. This system is regulated "by an ordinance of the Colony." There are no facts on which to base a comparison of the yield, but it may be assumed that the manufacture is of a rude character, and that there is a great loss of available sugar. The sugar mills are all small and only common muscovado sugar is made.

181. It is stated that the abolition of the metayer system would be beneficial to all concerned. It is probable that cane farming with one or two central factories would be more successful, and that such a system might eventually assist to revive the drooping fortunes of the island. One proprietor has already started cane farming with 60 farmers who have agreed to sell their canes at 4*s*. per ton, the estate undertaking the carting to the mill. In the

evidence of the Commissioner (the Hon. W. Low) it is stated "one "factory could be placed to windward, and one to leeward." He is of opinion that "a factory would pay, even if foreign bounties "be maintained."

182. The rates of wages are 8*d.* to 10*d.* per day. The practice of paying wages either in kind or at such long intervals as one to two months is said to be prevalent. The labouring classes are described as "fond of sugar cultivation, and reluctant to give it up." If the cultivation of sugar were revived, it is stated that the considerable number of Barbados labourers with their families who have already settled in the island would be greatly increased. They would probably prove excellent cane farmers. The conditions in Tobago as regards soil and climate are so similar to Barbados that a large portion of the surplus population of the latter island might be settled in families at a small cost in Tobago. The two islands are only about 24 hours distant.

183. "The cost of producing a hogshead of sugar (2,000 lbs. "weight) under the metayer system is about 7*l.*" This is equivalent to 7*l.* 16*s.* 9*d.* per ton. The decline of the sugar industry during the last 25 years is shown in the following table, giving the average annual value of the collective exports (sugar, rum, and molasses) for the periods named —

Periods.	Average Annual Value.
	£
1875–1879	71,000
1880 1884	49,000
1885–1889	18,000
1890–1894	10,000

The value for the year 1896 was 5,109*l.* Formerly the bulk of the Tobago sugar was shipped to the United Kingdom. At present, none of it is sent thither, as, according to the evidence, "Tobago sugar is practically excluded from the British market."

184. It is stated that the final blow to the sugar industry in Tobago was given in 1885 by the sudden collapse of a firm that held two-thirds of the sugar estates in the island. Up to that time sugar was the only industry, and no attempt had been made to start any other. The breaking up of this firm completely disorganised the economic condition of the island, and left a considerable number of labourers or metayers, without the means of support. The estates were sold at almost nominal prices, and many were broken up. The people took to the cultivation of ground provisions to supply themselves with food, while many emigrated to Trinidad. Those that remained struggled on for some time scarcely earning the means of existence.

185. The present condition of Tobago, in spite of its fertile soil, healthy climate, and an industrious labouring population, is a striking instance of what may happen to other portions of the

West Indies, unless timely and well organised efforts are made to improve the sugar industry and (where suitable conditions exist) start new industries.

Other Industries than Sugar.

186. *Cacao.*—About one-seventh of the total area is above 1,000 feet elevation, hence there is a diversity of climate suitable for most tropical and sub-tropical plants. Considerable effort is being made to encourage the cultivation of cacao. Altogether about 700 acres has already been established in small patches from one to ten acres in extent. The Commissioner states that "316 acres in "cacao have been planted in lands bought from the Crown "during the last three or four years." The exports, so far, are trifling, and probably do not exceed 600 bags per annum. Of these 450 bags (of 150 lbs. each) were exported in 1896 to Trinidad. An instructor in cacao from Trinidad was appointed by the Government last year, and he has already "given much valuable "information to growers." Mr. Hart speaks favourably of the prospects of cacao cultivation in Tobago, while the Commissioner (Mr. Low) is of opinion that on the extension of the cultivation of cacao and coffee "the future welfare of the island will principally depend."

187. *Coffee.*—Large areas are suitable for coffee in the higher lands. Mr. Hart recommends that the trees be sheltered by heavy belts of the natural forest on the ridges, and around the most exposed fields. "If properly harvested and cured, coffee should "become a most reliable cultivation, and one that should show a "considerable margin of profit." Tobago coffee, in the New York market, has recently been placed at an exceptionally high value.

188. *Cocoa-nuts.*—Large plantations of the cocoa-nut palm extend along the coast. The Commissioner states that "cocoa-"nuts abound, and are largely used locally, in addition to which "more than half a million are annually exported. With "scientific treatment, the output and quality could be consider-"ably improved." The exports in 1891 were 884,210 nuts, of the value of 2,722*l.* Mr. Hart reports that "the trees were in good health, and no disease of a prominent character was noticed." The nuts, however, were small. For the improvement of the cultivation, it was recommended to obtain seed-nuts from Central America or Jamaica. Possibly careful attention to manuring and mulching the trees during dry seasons would also have a beneficial effect.

189. *Fibre Plants.*—A valuable fibre plant known as "silk grass" (a species of *Furcræa*) is abundantly found in the island. This yields a white rope fibre similar to Sisal hemp. It has lately been cultivated on an abandoned estate near Scarborough. The quantity established (about 100 acres) will not, however, justify the necessary expenditure for machinery to extract the fibre. A plantation of at least 1,000 acres would be required to keep the machinery regularly employed. The cost of a Todd machine or similar machine with engine and press, as employed in the Bahamas, would be about 1,000*l.* This would prepare half a ton of fibre per day. The present price of Sisal hemp is about 14*l.* per

ton.* It would be necessary therefore to produce it ready for shipment in Tobago at about 6*l*. or 8*l*. per ton. With the cheap labour obtainable in the island, and the vigour with which the plants grow, this might not be impossible. It would necessarily require experienced management to start it.

190. *Stock Raising.*—Mr. Hart states : "Owing to the abundance "of guinea-grass in both the Leeward and Windward districts, "the breeding of horses, cattle, and small stock could be carried "on much more extensively than at present. Horses thrive "remarkably well, and the Tobago pony is a sturdy and reliable animal. . . . Excellent mutton is also raised in the island."

191. One witness recommends that "the Government should "import two thorough-bred sires, two first-class asses, pure-"bred Zebu bulls, and English rams . . . . and start a "small stock farm . . . to improve the breed of all kinds of "stock in the island." It is suggested that the present tax on brood mares and she-asses should be remitted. During the year 1896, 586 cattle, of the value of 1,465*l*., were exported to Trinidad. This trade might be greatly increased. It is noticed that the total imports of cattle into Trinidad amount to 35,000*l*. annually.

192. As showing the singularly diversified character of the productions of Tobago, the following list is given of the value of the exports to Trinidad during the year 1896 :—

	£
Sugar	1,827
Molasses	156
Cocoa-nuts	210
Cocoa-nut oil	621
Cacao	1,125
Vegetables (such as peas, corn, potatos) ...	760
Plantains	194
Other vegetable products	50
Fruit in packages	6
Poultry	871
Eggs	313
Cedar	40
Turtles (27)	16
Asses (6)	15
Cattle (586)	1,465
Dogs (6)	8
Goats (2,153)	432
Horses (65)	650
Pigs (1,774)	1,327
Sheep (338)	254
Total ...	10,340

193. There is no agricultural society existing in the island, nor any organisation maintained for the improvement of local industries. Agriculture is not taught in schools. It is mentioned

* In Messrs. Ide and Christie's Monthly Circular for June 1897 it is stated that "Bahamas fibre on spot realized 15*l*. 10*s*. for 54 bales of good quality."

in evidence that much advantage would result from "the "establishment of a small but well organised botanical station for "the purpose of producing and distributing seeds and seedlings "of economic plants suitable for the island." A station connected with the Botanical Department in Trinidad was in existence for a short time, but it was given up owing to the straitened circumstances of the island. This station might be revived on the basis of the suggestion made to that effect in the Appendix to this report. It would be desirable, also, that the Superintendent of the Trinidad Gardens should annually visit Tobago to advise in regard to new industries, and to arrange to supply seeds and plants to those desirous of cultivating them.

194. Mr. Hart might also advise in regard to the injury to cultivation caused by the "yellow ant" known in Trinidad as the "umbrella ant." This is specifically mentioned in a petition of Tobago labourers presented to the Commission by Mr. Clemens.

195. The Commissioner states that steps are being taken to open up some of the Crown lands by selling them in small lots to labourers. So far these lands are being taken up slowly, but roads are being made to some of them, at a cost of 1,000*l*. A loan of 9,000*l*. has lately been obtained to improve the public roads, including those to the Crown lands. It is important that the planting of the Crown lands should be carefully supervised, in order to prevent their impoverishment merely for the temporary purpose of growing ground provisions.

[The Bibliography of Tobago is scanty. The following works and memoirs may be usefully consulted :—

Woodcock, Henry Iles. History of the Island of Tobago. Kingston, 1866.

Hay, L. G. Description of Tobago (with list of Exhibits) : Handbook of West Indies, Indian and Colonial Exhibition (pp. 73–89). London, 1886.

Hooper, E. D. M. Report on the Forests of Tobago. Colonial Office, 1887.

Report on the Agri-Horticultural Resources of Tobago, by J. H. Hart. Trinidad Bulletin, No. 12, 1889.]

VI.—GRENADA.

196. Grenada is a mountainous and picturesque island, containing about 133 square miles, or about one-half the size of Middlesex. On the leeward side bold headlands with intervening valleys and ravines come down to the sea. On the windward side, the slopes are easier, with stretches of comparatively level land extending north and south parallel to the coast. There are numerous springs and streams, and two crater lakes exist. The most striking of the latter is the Grand Etang, at an elevation of 1,740 feet. The conformation of the country is generally well suited for agricultural purposes; the rainfall is usually regular and abundant, and the soil is fertile. The latter has been formed by the disintegration of volcanic rocks, and varies from a loose friable loam to a reddish strong clay. When the clay is of a marly character resting on broken rock it yields large crops of cacao and nutmegs. Grenada is a particularly healthy island; the heat is tempered by regular trade winds, and destructive hurricanes are practically unknown. The roads for so hilly a country are in fair order; those in the mountains are bridle paths, but are suitable for the transport of produce. A regular coasting service is maintained round the island.

197. Connected with Grenada are certain outlying islands called the Grenadines. The largest are Carriacou and Cannouan. These, owing to the almost complete destruction of the original forest, have an arid climate and a poor soil. The estimated area of Grenada and the Grenadines is about 85,015 acres. Only about 250 acres are estimated to be in swamps, and the area of other useless land is placed at 5,000 acres. During the earlier part of the present century Grenada was a prosperous sugar colony. At present the sugar cane is cultivated to a small extent. The whole island is now devoted to the cultivation of cacao, spices, provisions, and fruit. Tropical fruits and vegetables are abundantly produced, and of good quality. The food of the negro peasants consists of yams, sweet potatos, pigeon peas, Indian corn or maize, cassava, and bread fruit. The population in 1891 was 53,209, or 400 to the square mile. It was estimated in December 1895 at 59,101, an increase of 11 per cent. Nearly one-half of the adult population is directly engaged in agricultural pursuits.

198. In 1895, in Grenada and Carriacou, there were 6,799 holdings, containing 76,838 acres, owned by private persons. The estimated area of the Crown lands is from 3,000 to 4,000 acres. About 11 per cent. of the total area of the Colony is still covered with forest. The principal cultural industries in order of importance are cacao, spices, sugar, cotton, ground provisions, fruit, coffee, and kola. The estimated area under cultivation in these industries is as follows:—cacao, 20,000 acres; spices, 2,000 acres; sugar, 1,000; cotton, 1,000 acres; other cultivations, 1,000 acres. The area under ground provisions and fruit is not estimated; the area in pasture land is about 7,000 acres.

199. The principal exports of the Colony for the year 1893 were of the value of 313,000*l.* They were made up as follows: cacao, 281,004*l.*; spices, 14,605*l.*; cotton, 7,343*l.*; cotton seed, 1,493*l.*; live stock, 2,443*l.*; logwood, 1,171*l.*; grain, 973*l.*; sugar,

731*l.*; coffee, 226*l.*; fruit, 831*l.*; firewood, 964*l.*; ground nuts, 253*l.*; hides, 153*l.*; kola nuts, 16*l.*; manures, 148*l.*; poultry, 696*l.*; cocoanuts, 91*l.*; turtle shell, 118*l.*

Sugar Industry.

200. The area now under sugar cane is placed at about 1,000 acres; only one or two estates (with less than 100 acres in canes) are wholly devoted to sugar cultivation; the remaining areas, chiefly in the hands of settlers, are scattered all over the island. The sugar works still existing are kept up chiefly for the distillation of rum, of which there is a local annual consumption of 60,000 gallons.

The gradual extinction of the exports of sugar from Grenada is shown in the following table :—

Year.	Value of Exports.	Year.	Value of Exports.
	£		£
1882	20,688	1893	731
1883	25,877	1894	50
1884	18,395	1895	15

At the present time the island does not produce sufficient sugar for its own consumption. In 1895 upwards of 500,000 pounds of muscovado sugar were imported from the neighbouring colonies.

201. The growth of other industries is shown in the following comparison of exports for the years 1881 and 1893–94 :—

Exports.	1881.	1893–94.
	Lbs.	Lbs.
Cacao	5,864,000	8,500,000
Spices	100,000	200,000
Sugar	2,038,000	14,000

202. There are some good lands at low elevation not yet taken up for any other industry. One witness considers that such lands "are more suited to the cultivation of the sugar cane than any-"thing else . . . and were it possible to make sugar a paying "industry in the West Indies, such lands would yield splendid "returns." Cane farming and central factories are suggested as the most favourable means for effecting this.

Cacao.

203. The first planting of cacao in Grenada took place on mountain lands in a cool and moist atmosphere, above the then existing sugar estates. It was only some years later that it was found that cacao trees bore even better crops in the lowlands. This gave a great impetus to the cultivation, and the industry has now

extended over nearly every part of the island. The substitution of cacao for cane in Grenada has rendered the island entirely independent of sugar. This is the only West Indian colony of importance where this is actually the case. While there are several large cacao properties existing in the island, it is a special feature of Grenada that the labouring classes own a considerable number of small holdings. There are 5,600 holdings under 5 acres, covering a total area of 8,338 acres; 843 holdings from 5 to 20 acres, covering a total area of 7,231 acres; and 205 holdings from 20 to 100 acres, covering a total area of 8,830 acres. Hence, the numbers of persons owning properties containing less than 100 acres is 6,648, or about 11 per cent. of the total population of the Colony.

204. Latterly the price of cacao, as indeed of almost every tropical produce, has greatly declined. This has caused some depression amongst all classes of proprietors, but it has been most severely felt by the labouring class with small holdings. It has affected them not merely because the margin of profit has been reduced, but owing to circumstances of a special character. These are described by the Archdeacon of Grenada as follows:—

205. "Anyone who has watched carefully the progress of events "during the last quarter of a century, cannot have failed to see "what a great difference there is in the same men as peasant "proprietors of to-day and as sugar plantation labourers of "former times. . . . There is, however, an obverse side, "which is patent to the observer. . . . . Unaccustomed to "appreciate values, they have spent money in building houses "too large and expensive in their desire to improve their homes, "and they have not practised the economy necessary at the "start of new fortunes and in the case of limited incomes. "Above all, we have had the deadly injury inflicted upon the "peasant proprietors, unaccustomed to business transactions, "ignorant of the real value of money, unable to estimate "accurately the spending power of their properties, by the "advancers of money on produce, who, in order to enrich themselves when cacao was bringing a high price, loaned large sums "on the security of land and on the proviso that produce should "be shipped to them, to men unable to expend the money judiciously, and who, if any considerable drop in prices should take "place, would be unable to pay their debts, allowed, in some "instances, to run up to very large sums. This system has been "ruinous to peasant proprietors, resulting either in the loss of "their properties or in a condition of present want, enforced "by the necessity of extricating themselves from debt and of "endeavouring to save their holdings."

206. The statements above given are supported by the fact that in February last the attention of the Royal Commission was drawn to the large number of properties advertised for sale in the island under levy for unpaid taxes for 1895–96. These amounted to upwards of 600, as scheduled in the *Government Gazette* of 1st February 1897. As shown in the memorandum furnished by the Acting Colonial Secretary, taxes were eventually paid on 145 properties; in 29 cases the properties were sold and

the owners were evicted or are liable to eviction, while the properties unsold were forfeited to the Government. The remaining properties numbered 294, and of these 29 only included any land.

207. The Agricultural Commission appointed by Sir Charles Bruce in 1895 indicated in its report that the circumstances described above as affecting the peasant proprietors, with some notable exceptions, were applicable also to the proprietors of large estates. It stated "most of the agriculturists in the "island . . . are in a position of great financial difficulty." It continued : "In our opinion . . . the connection between "the present financial distress and the high rate of interest "demanded for money in the island cannot be set aside . . . "the standard rate for short loans is 8 to 10 per cent. and more ; "for loans made for a period of years, with the condition that "the borrower shall consign cacao to or through the lender, to be "sold on commission, 6 per cent. is charged . . . . At the "present price of cacao. and even at a slightly better price, it "will be impossible to work at a profit a cacao estate burdened "with mortgages bearing such high rates of interest."

208. Further, many owners bought their present estates with borrowed money when cacao was selling at 90*s.* per bag ; now that cacao has depreciated to 50*s.* per bag they have still to pay the same rate of interest out of proceeds reduced by nearly one-half. The remedy suggested by the Agricultural Commission is "the introduction of money into the colony by a Government "guarantee . . . to be lent out at a reasonable rate of interest "on security of an unquestionable character."

209. The range of prices in Grenada cacao during the last 12 years is shown in the following table :—

Year.	1st January.	1st July.	1st December.
	s. *s.*	*s.* *s.*	*s.* *s.*
1884	72 to 80	63 to 79	61 to 78
1887	63 to 72	70 to 77	60 to 70
1890	53 to 64	55 to 63	54 to 64
1893	64 to 68	71 to 76	61 to 64
1896	44 to 50	41 to 47	40 to 46

It is admitted that prices in 1896 were lower than they have been for more than 20 years.

210. The cost of production of cacao in Grenada is approximately placed by Mr. Lascelles at 1*l.* 5*s.* per cwt. Mr. Gurney places the cost of producing a bag (168 lbs.) of cacao at 1*l.* 5*s.* to 1*l.* 15*s.* This would be at the rate of 16*s.* 8*d.* to 1*l.* 3*s.* 4*d.* per cwt. The latter estimate would probably apply only to large estates in full bearing and with the best appliances for curing the produce. It is evident, however, from these figures that where estates are unencumbered and carefully and skilfully worked there is still a margin for profit even at present prices.

211. The position and prospects of Grenada cacao are discussed by so capable an authority as Mr. Gurney in the following words :—"Having regard to the fall in price for Grenada cacao, "of about one-fourth, during the past two years, and its being "impossible to foretell how prices may go in the future (though "I am inclined to think they will not go much, if any, lower, at "any rate for some years), I consider the cultivation as at present "established in Grenada is sound and profitable . . . ."

"From my experience cacao is not to be relied on to give a "satisfactory average crop above the altitude of, say, from 600 "to 800 feet. At an altitude higher than this the seasons affect "the trees, more especially successive wet seasons, of which we "have had more than our share of late years; besides mountain "lands are far more expensive to work and keep in order, also "the cacao trees give endless trouble in keeping free from "parasites, moss, &c., which in the lower land they are com-"paratively free from.

"As a general rule I consider cacao trees to be in full bearing "at nine to ten years of age, at which age five to six hundred-"weight per acre is a fair return, and should be the average "output per acre for 20 years to come, provided the cacao "receives ordinary care and tillage. . . .

"At present range of prices the net result may be taken as at "40*s.* per hundredweight, equal to 10*l.* to 12*l.* per acre; an "established acre of covered-in cacao is worked at a very small "cost, say at 3*l* .per annum, including cost of curing, produce, &c., "but it must be remembered this applies only to a thoroughly "established, covered-in piece of cacao. Taking the average cost "per bag of, say, 1½ hundredweight (168 lbs.) to proprietors "working estates on a large scale, each bag of cacao costs 1*l.* 5*s.* "to 1*l.* 15*s.*; in other words, 100 acres of fairly established cacao "should yield, say, 300 bags, realising 900*l.* The cost of produc-"tion of this quantity would probably be 450*l.* to 500*l.*, including "staff, curing, porterage, shipping expenses, &c.

"Cacao cultivation has been extended during the past 20 years, "mainly through the labouring classes obtaining by purchase "small holdings of land and planting up the same in cacao; also "they have planted up a large area of rented garden lands in "cacao on the different estates throughout the island, besides the "estates themselves have been planting up all the time." Where private lands have been bought by labourers Mr. Gurney's experience is that such lands in small lots of half an acre to three acres near the coast have been paid for at the rate of 20*l.* to 30*l.* per acre. Lands in forest more or less in the mountains have been sold for 4*l.* to 6*l.* per acre. In all cases easy terms of payment were arranged.

212. In the Report of the Agricultural Commission of 1895 the following suggestions were offered in regard to the maintenance of the cacao industry :—"We are of opinion that the best remedy "for minimising the results of the fall in the price of cacao is to "be found in systematic and intelligent efforts to reduce the cost "of growing and curing the crop by extra industry, economy,

"and good management. In short, there must be economy of "production all round. But it must be economy by which "prosperity comes, and by which labour is put to the best "advantage. There must also be improvement in agricultural "methods generally, and in the cultivation of the land in "particular with the prime object of increasing the productive "capacity of the cacao plantations."

Spice Cultivation.

213. Grenada owes to the late Colonel Duncan the initiative in regard to the systematic cultivation of spices. He established what is now the largest and most valuable nutmeg plantation in any part of the New World. This estate is situated in a depression in the centre of the island, and contains 250 to 300 acres of nutmeg trees in an excellent state of cultivation. Nutmeg and clove trees have existed in many parts of the island for the last 50 years, and their cultivation is still being gradually extended. As stated in the *Kew Bulletin*, 1891, p. 146, on an estate in Grenada, at an elevation of 1,100 feet, a number of nutmeg trees, "covering about 10 acres of land, have been known to yield "annual crops of nutmegs and mace of the gross value of about "1,000*l.* sterling." This is, of course, a very exceptional instance. Mr. Gurney, who has had charge of Colonel Duncan's estates for many years, gave the following evidence before the Commission in regard to nutmeg cultivation :—

214. "This is a cultivation of great help to the island; the "people in most cases have a few trees in their holdings, and the "estates have areas more or less established. To the small holder "they are a source of weekly income, as he sells his few pounds "weekly to some local dealer. To the estates having any quantity "they are a regular source of revenue. The price of this produce "has gone down of late years; there is still, however, a fair "margin of profit once the trees are established, but it is a "cultivation requiring a very large capital to establish on any "considerable scale, as from the planting to the bearing profitably "of the trees a period, under favourable circumstances, of not "less than 12 years must elapse, indeed there is nothing much "in it as a large cultivation under 14 years. I cannot speak from "experience altogether, but at the same time I think an acre of "nutmegs of, say, 25 years of age will give a net profit per annum "of 25*l.* at the present range of prices."

215. Nutmeg trees thrive best at elevations of 800 to 1,500 feet. The crops consist of nutmegs and mace. The latter is the red fleshy network covering the fresh nutmeg: when properly cured it is of a golden colour. The cultivation of cloves is not so promising as nutmegs, as the market is already overstocked with supplies from Zanzibar and the East Indies.

Coffee.

216. The Agricultural Commission of 1895 reported in regard to coffee as follows :—"There has been among our witnesses a

"general concurrence of opinion on the point that coffee is the "best and in every way the most suitable economic plant to "encourage in this island as a subsidiary and 'second string' to "our present staples—cocao and nutmegs."

217. It was recommended that instruction in regard to the best methods of planting, growing, and curing coffee should be distributed in the island, and that the Botanic Station should supply plants at cost price. Mr. Whitfield Smith speaks highly of the prospects of Liberian coffee in Grenada. He states that Liberian coffee is very hardy "and grows in localities where scarcely anything else will grow, from the sea-shore up to 1,500." The cultivation is being taken up by large planters on land too high for cacao. If the peasants were also encouraged to purchase or rent suitable tracts of mountain land from the estates it would be possible to establish a considerable area with Liberian coffee in the island. "This is all the more probable," Mr. Smith continues, "when it is remembered that to the tenants and peasants who "planted cacao in this way in years gone by Grenada owes the bulk "of the cacao fields existing at the present day."

218. Mr. Gurney is a strong advocate for the cultivation of coffee as an adjunct to cacao and nutmegs. "I find," he adds, "the Liberian coffee the most hardy and the most suitable to our "class of labourer and cultivation . . . it thrives from sea-"level to the mountains." Premiums have recently been offered by the Government of Grenada for the encouragement of coffee cultivation, and there is every indication that the subject will receive general attention. It is desirable, where suitable conditions exist, that both Arabian and Liberian coffee should be tried. In doubtful cases it would be well to mix the two. The latter would then take the place of the former if it failed. It is well known amongst consumers in the United States that Liberian coffee loses its somewhat coarse flavour by keeping. That, probably, is the reason why Liberian coffee is more in demand in the American than in the English market.

Other Industries.

219. The cultivation of *Kola* has received some attention in Grenada, and is extending. Mr. Gurney states that the trees grow readily at most elevations, and, in his opinion, will eventually prove a source of revenue. The trees take as long to come into bearing as nutmegs, but require little or no attention; and the gathering and curing of the crop are of the simplest nature. The prices obtained "are most erratic and unreliable at present"; but it is pointed out that "any price realised over, say, 4*d.* per lb. would yield a profit."

220. There is probably not sufficient land easily accessible for embarking in a *Banana* cultivation, but the cultivation of *Oranges* and grape-fruit should be remunerative, as citrus fruits generally are of excellent quality. The oranges closely resemble the once famous St. Michael's orange, and the supply is abundant. Some shipments made to New York in 1895 cleared 4 dollars per barrel. While prices are good, it would be most desirable to carry on a

regular orange trade in Grenada. The grading and packing are points to which special attention should be devoted. The Government might assist by placing the shipments under some system of supervision to prevent the export of inferior fruit and supply the services of an instructor to show how the fruit should be handled and selected to suit the market. Other subjects that might receive attention are grapes, pine-apples, and mangoes. Tobacco does not seem promising, except in the hands of Cubans. With the view eventually of establishing a small trade in logwood, the trees at present existing in the island should be kept clear of other vegetation, and extended in suitable localities. According to Mr. Wildman there is a want of "trained professional aid in helping to grow new industries" and "imported professional skill" to find out which products and cultivations would best suit the various tracts of land which make up the grand total of 20,000 acres now lying ruinate in the Colony. Such assistance could be afforded by the staff at the Botanic Station, which should, however, be increased as suggested later on.

On the whole the circumstances of Grenada are not of a desponding character. The chief concern should be to safeguard the interest of the cacao industry, upon which practically the prosperity of the island depends. As stated by the Archdeacon: "It is to be hoped that the crisis through which a great number "of the owners of holdings have been passing for some time will "be safely tided over, as it would be disastrous if any considerable "change should take place in a condition of things which is a "healthy and beneficial one for both country and people. With "their properties free of mortgage and other debts, and with more "pains taken to develop the yielding power of the land, of which "there are signs in such operations as draining and forking and "pruning, the prospects of the owners of holdings will remain "good—certainly far better, in the cases of all but very small "holdings, than those of mere labourers on estates."

221. Efforts should be made to keep the land already under cacao in a productive state, and to maintain the trees in a thoroughly healthy condition. Old and decayed trees should be regularly replaced by young trees. The use of manure is to be encouraged on intelligent lines, and subject to the character and requirements of the soil. On this point the valuable report presented by Professor Harrison on the soils of Grenada will prove of great service.

222. It is very desirable that the information contained in this report should be clearly and concisely explained to the small cultivators. This might be done by a course of popular lectures delivered in each district. Arrangements would also have to be made for supplying suitable manures of guaranteed quality at the lowest possible cost.

223. It is most important that the interest of the small settlers in their holdings should not be allowed to slacken, or that the cultivation be neglected owing to the fall in prices. Every acre of land now in cacao that is abandoned is a loss to the community

at large. I would recommend that the services of the Curator of the Botanic Station be again utilised to visit the outlying districts at frequent intervals, and to give lectures and demonstrations on the treatment of the soil, the best methods of cultivation, and curing the produce. The advantages of such a plan have already been clearly shown, and just now they would be of the greatest value in assisting to maintain the chief industry of the Colony in an effective condition.

Botanic Station.

[A full description of the Botanic Station at Grenada appeared in the *Kew Bulletin*, 1891, pp. 149–152. The station was started in 1886. It is situated about a mile to the eastward of the town of St. George by road; but may be reached by water by a much shorter distance. The land is bounded on the north by the steep slope of Richmond Hill, and occupies a sheltered situation facing the harbour. To protect it from the wash coming down at the back a large well-paved drain was arranged to be constructed above the garden boundary. The locality was described by a former Governor (Sir Walter Sendall, K.C.M.G.) as a "good site, well watered, accessible, and apparently suitable in every way." The first grant was 300*l.*, with a further sum of 1,000*l.* towards establishing and laying out the garden and providing a house for the Curator. The objects of this garden were stated as follows: "To introduce and distribute plants of great economic value, to supply practical hints respecting new and promising industries, and to develop and improve existing minor industries." The first Curator was Mr. W. R. Elliott, from the Jamaica Gardens, who took charge in March, 1886. To him is due the credit for laying out the permanent features of the present garden and planting the principal trees now contained in it. Mr. Elliott resigned in 1889, and was succeeded after a brief interval by Mr. Murray, who in turn gave place, in 1890, to Mr. George Whitfield Smith, previously Botanical Collector in St. Vincent. Mr. Smith proved an active and energetic officer, and greatly improved the gardens. He also prepared useful reports and bulletins, and gave a series of lectures in the country districts on agricultural subjects. On Mr. Smith's retirement in 1894, Mr. Walter E. Broadway, Assistant Superintendent of the Botanic Gardens, Trinidad, was appointed Curator. Mr. Broadway is still in charge. In addition to the Botanic Garden, he is responsible for the Government House Grounds, the forestry of the Morne Rouge Estate and Quarantine Station, of the mangrove shores of the lagoon near the Botanic Station, and of the Spout Lands. In his report for the year 1896 Mr. Broadway affords ample evidence of the service rendered to the agricultural interests of the island by the Botanic Station.

Attention was drawn to a fine variety of orange, believed to be peculiar to Grenada, and hence called the Grenadine orange. The plant is a robust grower, and the fruit larger than the ordinary sweet orange, with a thick rind and abundant juice. It is anticipated that it would be an acceptable fruit in foreign markets.

An attempt was made to grow tobacco on land adjoining Government House Grounds. The produce was cured and sold locally at 10*d.* per pound. Further experiments are in hand.

In December, 1896, the first crop of seed of a species of *Landolphia*, one of the African rubber vines, was collected in the garden. The plant had climbed to the top of a Saman tree, and there the fruit ripened. Other valuable rubber plants that produced seed in 1896 were the Para Rubber (*Hevea brasiliensis*), Central America Rubber (*Castilloa elastica*), and the Ceara Rubber (*Manihot Glaziovii*).

Two new kinds of coffee were introduced—the Sierra Leone native coffee (*Coffea stenophylla*), and Abbeokuta coffee. The latter has not yet been determined.

The receipts for about 4,000 plants sold, all at less than cost price, was 73*l.* The plants received from Kew and other establishments amounted to 2,116, while the number of packets of seeds received was 272.

Attention was called by the Curator to the serious effect of deforestation in Grenada. The best timbers are everywhere being gradually destroyed to convert into charcoal. This subject is referred to in a later section of this Report.

The Herbarium of Grenada Plants consists of a fair collection; 700 sheets were added during 1896.

Having visited the Grenada Garden on three occasions, viz., in 1886, 1891, and 1897, respectively, I am able to speak from personal observation of the improvements that have steadily taken place, in spite of the numerous changes in the office of Curator. The garden, as seen in March last, was in excellent condition; the growth that had taken place amongst the trees, especially species of *Eucalyptus* and *Casuarina*, and in several species of palms, was remarkable. Of the latter, *Oreodoxa regia* was 25 ft. high and looking singularly strong and healthy. With a suitable supply of manure and water, essential in the maintenance of a botanic garden in the tropics—as indeed everywhere else—the Grenada Garden should become a most attractive and useful institution.

The following treat of the botanical and agricultural resources of Grenada:—

Wells, J. Description of Grenada (with list of exhibits). Handbook of West Indies. Indian and Colonial Exhibition (pp. 29–33). London, 1886.

Hooper, E. D. M. Report on the Forests of Grenada and Carriacou. Colonial Office, 1887.

Murray, G. A Half-holiday in Grenada: Gardeners' Chronicle, ser 3 (1888), i., p. 8.

Morris, D. Botanical Enterprise in the West Indies—Grenada: Kew Bulletin, 1891, pp. 145–152.

Smith, G. W. Grenada Agricultural and Botanical Bulletin. St. George's, 1890–93.

Report of the Agricultural Commission appointed by Sir Charles Bruce in 1895. Government Printing Office, St. George, 1896.

Drayton, Edward. Grenada Handbook for the years 1896 and 1897. London, 1896-97. [List of Indigenous Trees and Shrubs by W. E. Broadway, pp. 196–204.]

Harrison, J. B. Rocks and Soils of Grenada and Carriacou, with notes on the Agricultural Chemistry of Cacao. Colonial Office, 1897.]

Teaching Agriculture in Schools.

225. It is hoped that efforts will be made to teach agriculture, at least theoretically, in the elementary schools, and to start school gardens, so that the cultivation and treatment of the soil may become more popular than they appear to be at present amongst the rising generation. In regard to the latter point the Committee charged with the preparation of evidence for the Royal Commission states that the "advanced educational pro-"gramme has greatly crippled the labour supply, and deprived "agriculturists of the services of the younger portion of the "labouring class." This is understood to refer to the continuation of children at school beyond a certain age. The same subject is discussed in the statement submitted by the various ministers of religion as follows :—"In many instances the acquisition of a small "holding results in the persistent labour of the individual owner, "while the younger generation, knowing that their parents possess "as much as to furnish necessaries, are content to grow up in any-"thing but a thrifty condition. In this respect small holdings "do not tend to promote thrift, especially among the younger "generation.

"We are of the opinion that the lack of thrift, and the indiffer-"ence of the younger generation, might be remedied by the intro-"duction of the subject of agriculture in the school curriculum. "The theory of agriculture may be taught by the use of text-"books, or as one of the subjects in the higher standards of the "elementary schools ; but the present staff of teachers cannot be "expected to go beyond that, inasmuch as by the code of education "recently inaugurated the teaching power of the schools has been "considerably reduced. We are, however, of opinion that further "instruction in that branch may be imparted by the appointment, "in each parish or district, of a competent itinerary agriculturist, "who should visit every school in the parish, and teach the "subject."

Clearing Forests.

226. Mr. Lascelles drew the attention of the Commission to the evil effects likely to arise from the further removal of the original forest in Grenada. This matter has already been the subject of a letter by the Administrator (the Hon. Edward Drayton), in which he made an appeal to the Road Boards, "as representative of every class and interest in the community," to do all in their

power to stop the growth of the evil. Glaring instances of the wholesale destruction of high woods on private lands are already apparent, and if not stopped by stringent measures it is probable that irreparable injury will be done to the cultivated areas in the mountains as well as to the island generally. Mr. Drayton concludes :—" I feel assured that, with these facts before you, you " will do all in your power to assist in the conservation of the " remaining forests of the island, and that you will try and " persuade those in your vicinity to have a rational regard for " their own and the general interests when contemplating the " indiscriminate clearance of lands."

227. Sir Charles Bruce, in the Blue Book Report for 1895, returns to the same subject. He records that, "on the 30th " September of that year a rainstorm of great severity visited the " northern districts of Grenada and the island of Carriacou. In " Grenada, roads, bridges, and telephone lines were swept away, " the damage under these heads being estimated at over 5,000*l*. " Many acres of cultivated land were also laid waste or carried " away. A catastrophe of the same kind, in 1894, had already " called my attention to the necessity of providing against the " denudation of the forest lands in the Colony . . . it is " admitted that such clearings, if undertaken without proper " precautions, are the fruitful cause of torrents, and generally " increase surface drainage to the detriment of springs and " permanent watercourses, and I cannot doubt that the extension " of clearings on the slopes of the mountain ridges of Grenada is " tending to produce such results."

228. This important matter should be dealt with by making reservations of all forest lands above certain well-defined lines. The Crown lands can be dealt with at once, but it is important also that such of the private lands as are desirable to be kept in forest should be acquired by the Government. Such lands at present are a source of expense rather than of profit to their owners, as the annual assessment on uncultivated land is 6*d*. per acre. In any case, I have no hesitation in stating that any further clearing of the high mountain lands in Grenada is fraught with considerable danger to the future prosperity of the island.

229. CARRIACOU.—This is the largest and most important of the Grenadine Islands belonging to Grenada. It has an area of 6,913 acres, with a population of 6,190 souls. The chief town is Hillsborough. The Royal Commission landed on this island for a few hours on the 11th of February. At one time Carriacou was a prosperous little island, with no less than 22 sugar estates in full working order. All these have disappeared.

230. The only cultivation for export purposes now is cotton. It is stated that the average production per acre is only 50 pounds of the value in the English market of 4*d*. per pound. Cotton seed is also exported to a small extent. Corn and other ground provisions are grown by the labourers, but, according to the medical officer, "most of the land is owned by absentee " proprietors, who demand rents that are much too high under

" existing circumstances." In consequence " three-fourths of the " labouring men are forced to emigrate in search of work, leaving " the women and children to suffer great hardships."

231. The cultivation of Sisal hemp appears to have been started, but afterwards abandoned. Owing to the cheap and plentiful labour and the dry climate, it is possible that this might be successfully established in the island. There is little doubt it would pay better than cotton. Carriacou, and many of the Grenadine Islands, possess an arid climate, and are subject to recurring periods of drought. These are probably attributable to the destruction of the forests in former times for sugar boiling, and latterly to the reckless cutting down of timber for fire-wood exported to Barbados.

232. Mr. Hooper, in 1887, referred to the subject in the following words: "It is certain that in Carriacou, for the last seven " years, the rains have been slight and irregular in their " distribution. As a consequence the level of the water under- " ground must have receded below its normal point, and it " would require several very heavy rainy seasons to bring it " back to its accustomed height . . . the recovery of the " water is indefinitely delayed by the system of clearance " of all the vegetation, whether forest or other, which so regularly " obtains throughout the island. . . . I should strongly advise " the protection of all forest vegetation on the hill slopes and tops " down to a reasonable level . . . also trees, such as mahogany " and red ceder, should be planted in all suitable localities."

233. It would be of advantage if the Curator of the Botanic Station at Grenada were to visit Carriacou and examine carefully into its capabilities for growing a selected number of products. The Government might then encourage the cultivation of these, and assist the people in obtaining land on reasonable terms.

VII.—ST. LUCIA.

234. The Island of St. Lucia is the largest of the Windward group, and has an area of 233 square miles, rather less than Middlesex. The surface is very hilly. The main axis of elevation trends from north to south, with numerous ridges and peaks separated by deep valleys. Some of the sharp jagged peaks attain an elevation of 3,000 feet. The scenery is bold and rugged, and in certain parts, as in the neighbourhood of the Pitons, it is singularly picturesque. A large portion of the country is still covered with forest. The valleys are very rich and fertile, but the only ones at present cultivated are the Mabouya, Roseau, and the Cul-de-sac valleys. Two large districts in the northern and southern portions of the island consist of comparatively undulating or level country. There is an abundant supply of moisture from frequent showers, and vegetation seldom suffers from drought. The year 1895 was one of heavy rainfall. Observations on the Morne, 745 feet above mean sea-level, recorded a rainfall of 121·29 inches. In 1894 the record showed 81·55 inches; in 1893 it indicated 113 inches. The absolute maximum temperature recorded was 87·6° Fah. in the month of October, while in the same month the absolute minimum was 60·2° Fah. The climate in some of the valleys is not so healthy as elsewhere.

235. In St. Lucia only a comparatively small extent of land has been under systematic cultivation. It is estimated that not one-fourth of the total area is beneficially occupied at present. Much of it that once was cleared has since relapsed into ruinate or forest growth. In the interior are large tracts of mountainous lands belonging to the Crown. Some of these are at present quite inaccessible, either by roads or bridle-paths.

236. The population of the census of 1891 was 42,220; on the 31st December 1895 it was estimated at 45,906, or an increase of 3,686 since 1891. This is at the rate of 197 to the square mile. The death rate in 1895 was 22·4 per 1000. Immigration from India was resumed in 1878; there were in the colony at the end of 1895 721 indentured coolie immigrants. The total East Indian population at present in the island is estimated at about 2,560. The former connection of the island with France is shown by the existence of a French *patois* almost universally spoken by the labouring classes.

237. The chief products in order of importance are sugar, rum, molasses, cacao, logwood, coffee, ginger, annatto, black pepper, vanilla, and graines d'ambrette, or vegetable musk. The food products grown for local use are arrowroot, tout-les-mois (*Canna*), yams, sweet potatoes, various peas, beans; also fruits and some English vegetables in small quantities. Speaking generally, beyond the cultivation of sugar, and possibly cacao, the agricultural development of St. Lucia has hardly begun. The cultivation of other plants is of a partial and fitful character, and there is apparently an entire absence of practical knowledge respecting the requirements of most subsidiary industries.

238. Castries, the capital, possesses an excellent harbour, and is becoming an important naval and military station. The Imperial expenditure for military purposes in 1895 amounted to 45,194*l*. This is to be greatly increased by the construction of new works during the next few years. When the headquarters of the troops in the West Indies are ultimately removed from Barbados to St. Lucia, the latter island should derive considerable benefit from the money annually circulated. In Barbados this has hitherto been estimated at about 50,000*l*. Soufriere, near the Pitons, is the next town in importance to Castries, with a population of about 3,000 souls. It is the centre of an interesting agricultural district where sugar, cacao, fruit and spices are grown.

239. The following table gives the quantity and value of the principal exports in 1896 compared with the three preceding years :—

Exports.	1893.		1894.		1895.		1896.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Tons.	£	Tons	£	Tons.	£	Tons.	£
Sugar ..	4,437	90,571	4,483	66,161	3,627	49,355	3,618	61,949
	Gals.		Gals.		Gals.		Gals.	
Molasses ..	253,680	4,756	223,320	3,722	279,960	3,499	105,000	1,444
Rum	1,700	112	1,400	106	9,900	1,033	1,300	92
	Lbs.		Lbs.		Lbs.		Lbs.	
Cacao ..	1,037,600	38,910	983,200	23,513	696,200	15,664	1,066,900	14,396
	Tons.		Tons.		Tons.		Tons.	
Logwood ..	6,292	37,752	7,116	37,359	5,086	25,430	1,904	4,284

Sugar Industry.

240 The total value of the collective sugar products (sugar, rum and molasses) in 1896, compared with the total products exported during the previous four years, was as follows :—

Years . .	1892.	1893.	1894.	1895.	1896.
	£	£	£	£	£
Exports of collective sugar products ..	99,000	96,000	70,000	54,000	63,000
Exports of other products	79,000	126,000	122,623	94,000	73,000
Total exports	178,000	222,000	192,623	148,000	136,000

The decline in the value of the exports of sugar products in 1895 was due to a fall in prices, and probably also to the presence of cane disease diminishing production. No investigation has yet been made locally into the latter subject. The shrinkage in the value of sugar products on an average of years, although considerable, has not been so great in St. Lucia as in some of the other islands.

241. St. Lucia was at first devoted to the cultivation of cotton, cacao and sugar, afterwards coffee was added. Later the cultivation was more exclusively devoted to cane, owing to the increasing prices paid for muscovado sugar in the London market. Cotton-growing soon disappeared. Cacao gradually received less

attention, and in many cases the trees were even cut down to make way for canes. According to Mr. Hooper this has occurred within the last 30 years. Since, however, the island resolved to depend on a single industry the price of sugar has greatly and steadily declined. The sugar cultivation now remaining is chiefly attached to the large factories or *usines* established in the Cul-de-sac valley, Roseau Valley, Dennery and Vieux Fort.

242. The St. Lucia Usines and Estates Company, Limited, own or lease 13 estates, with a total area of 5,925 acres. These estates are situated in the Roseau Valley and Vieux Fort Quarter. The area occupied by cultivation in canes is 2,086 acres. The number of hands employed is from 1,700 to 2,000. The machinery is all of modern description, turning out vacuum-pan centrifugal sugar for the American market. The Dennery factory has a total area of 2,000 acres, of which 560 acres are in canes. It employs 450 hands. The central factory in the Cul-de-sac Valley has a total area of 2,000 acres, of which about 550 are now in canes. The actual cost of producing vacuum-pan centrifugal sugar is given at 10*l.* per ton. About 100 tons of canes were bought last year from small cultivators or cane farmers. With regard to this Cul-de-sac factory the mortgagees, according to the Blue Book report for 1895, gave notice of their intention to withdraw from the property, and to cease working both the factory and estates. It seemed possible that, under such circumstances, the property would revert to the condition of jungle "while not only would "the indentured immigrants have to be provided for under the "terms of their engagement, but a large body of labourers "belonging to the general community would be thrown out of "employment." A local syndicate came forward and took over, under an agreement with the Government, the working of the estates provisionally for a year. The results were so far favourable that it is possible that this important undertaking will be maintained on more successful lines than heretofore.

243. Besides the large estates there are about 70 small areas owned by peasant proprietors where no outside labour is employed. The proprietors and families work the estates, and the canes are either sold to the neighbouring usines or made into syrup for local consumption. The aggregate area of these 70 peasant properties is about 5,628 acres, while the area under canes is returned at 621 acres. Hardly any open pan or muscovado sugar is now made in St. Lucia. About 30 estates that formerly produced muscovado sugar have been abandoned during the last ten years. This has caused distress in certain districts, but in some cases the labourers have been allowed to rent land and grow ground provisions for their own subsistence.

244. Other estates on which the cultivation of canes is abandoned are being turned into pastures for cattle, and, where the land is suitable, are being planted in cacao, coffee, and kola. On one or two estates the canes are being ratooned simply for the purpose of making rum, while a few are rented out to be cultivated by metayers who supply the canes to be crushed, under an arrangement that the proceeds are divided between the proprietor and the labourer. The latter is only a temporary expedient, and will

possibly last only while ratoons are produced. No new planting is likely to be undertaken with present prices.

245. As regards the general position of the sugar industry, St. Lucia differs very materially from St. Vincent. In St. Lucia, while the cultivation is not extending even on lands in the neighbourhood of the central factories, the fact that well-equipped factories do exist, turning out a high class of sugar at a minimum loss in crushing and manufacture, gives the island a considerable advantage in meeting present difficulties. It is possible, if cane farming were well-organised and made remunerative for those engaged in it, that a much larger number of the labouring class would be willing to grow canes for the factories and thus tend to place the industry in a more flourishing condition. For this class of cultivation there would be a favourable opening also for immigrants from Barbados. The cost of introducing these would not amount to more than 8*s*. to 12*s*. per head.

Other Industries.

246. Next to sugar the most promising industry is that of cacao. The soil and climate at the head of the valleys on the leeward side of the island appear to be well suited for cacao. It grows freely and yields excellent crops. The St. Lucia Usines and Estates Company, Limited, has 100 acres in cacao, and it is stated that "the "results are satisfactory." It is added that this is the case only on special soils, and where the conditions of shade and exposure and moisture are suitable.

247. On the Crown lands there are 127 holdings of not less than 5 acres, 104 holdings of not less than 10 acres, 21 holdings of not less than 20 acres, and one holding of not less than 50 acres. In all there are 253 holdings with an aggregate area of 2,500 acres. About 75 per cent. of these holdings are in course of being planted in cacao.

248. Coffee is being tried in many districts. The Arabian coffee is only suitable for elevations above 1,000 feet. Such localities are obtained with difficulty, and, besides, it is undesirable to clear forest at this height in many parts of the island. On the other hand, Liberian coffee can be grown from sea-level upwards. It has already proved most healthy and productive, and its cultivation should be encouraged on all Crown lands in the neighbourhood of the present cacao plantations. In a report on the Dennery district, Mr. George S. Hudson states: "A few "planters have shown a disposition to take up Liberian coffee "as a cultivation, and there are instances of healthy bearing "plantations of this species of coffee, that give great promise of "the suitability of this plant to local conditions." The writer recommends that "several thousand seedlings of this and other "new plants be distributed free to small proprietors." The Arabian coffee is described as not a success in the Dennery district. Bearing nutmeg and kola trees looking extremely healthy are to be found here, affording evidence as to the suitability of their environment. Ginger is also successfully cultivated and prepared for market on plantations in this vicinity. St. Lucia ginger has been sold during the past year (1896) at 76*s*. per cwt. in the London market. It has been pronounced equal to that ordinarily shipped from Jamaica.

Botanic Station.

[The first Curator of the Botanic Station was Mr. John Gray, a highly qualified English gardener, who had been engaged for six years in carrying on experimental cultivation under General Talbot at Worthy Park, Jamaica. Mr. Gray devoted himself to the task of laying out and establishing a garden on what was possibly the most unpromising spot in the whole of the West Indies. He suffered much latterly from ill-health, and died in January, 1895.

The *Voice of St. Lucia* for the 17th January, 1895, stated: "Mr. Gray did good work in planning, laying out, and tastefully planting what was a half-filled swamp when it first came into his hands, but which in three years' time he transformed into a beautiful garden, which, though small, is an ornament to the town, and a much appreciated resort and breathing place for the townspeople. He introduced many varieties of plants and flowers, and the collection of roses at the station was perhaps the finest in the West Indies. In the matter of economic plants, he raised and distributed thousands of cacao, coffee, nutmeg, cola, and sisal."

In succession to Mr. Gray, Mr. John C. Moore was appointed Curator in July, 1895. Mr. Moore was a member of the gardening staff at Kew, and previously had been employed by the Right Hon. Evelyn Ashley, at Broadlands, Hants. Latterly, provision has been made for supplying the Curator with a horse "in order to visit the out-districts and advise the peasant proprietors and others with respect to the cultivation of their land."

In the memorandum of evidence submitted to the Commission by Mr. Moore, the following particulars are given respecting the work of the station:—

"The object of the station is to encourage the cultivation of economic plants, and propagate them for distribution amongst the people. The station receives regularly seeds and plants from the Royal Gardens, Kew, and other sources, as well as literature bearing upon their suitable cultivation.

"An annual progress report is regularly issued, giving the results of the year's work. Bulletins would be prepared if they could be printed by the Government Printing Office. So far this has not been possible.

"If the Curator were supplied with an assistant to take charge of the station during his absence, and with the means of getting about, he could occasionally go amongst the peasantry, and show them, by practical lessons, how to grow and prune their cacao and coffee trees, and cure the produce for export."

The following economic plants were distributed from the Botanic Station in 1896:—

Coffee	11,794
Cacao	3,530
Nutmeg	767
Kola nut	348
Oranges	122
Various fruits	144
Total plants	16,705

The demand for economic plants from the Botanic Station so far exceeds the supply.

As regards new industries the following are the most promising :—

Cacao is being gradually extended, and is remunerative at the lowest price last year ; the peasantry are capable of growing cacao, provided they are taught how to cultivate it properly, and curing the produce.

Liberian and Arabian Coffee ; both these are successfully cultivated in a small way. Liberian coffee is calculated to be most valuable if extended on a considerable scale. Arabian coffee is best for high elevations.

Nutmegs grow extremely well, and yield good crops ; mixed with coffee and cacao in suitable soils they should be very remunerative. Trees are in bearing at the Botanical Station at six years old.

Fruits might be very largely grown ; good sorts require to be grafted and budded, especially oranges, grape fruit, &c., &c.

Further information respecting the resources of St. Lucia may be obtained from the following publications :—

Harris, C. Alexander. Description of St. Lucia (with list of exhibits). Handbook of Indian and Colonial Exhibition (pp. 90–97). London, 1886.

Hooper, E. D. M. Report on the Forests of St. Lucia. Colonial Office, 1887.

Cropper, R. P. Fruit Industry of St. Lucia. *Kew Bulletin*, 1888, pp. 185–187.

McHugh, R. G. Handbook of St. Lucia. 1890.

Morris, D. Botanical Enterprise in the West Indies, St. Lucia. *Kew Bulletin*, 1891, pp. 134–140.]

249. The Botanic Station was started at Castries in 1887. The station is too small for experimental cultivation, but it has done excellent service in raising seedlings and distributing them all over the island. The total cost of the station, including the salary of the curator, in 1896 was 358*l*. ; the amount received for 16,705 plants sold at nominal prices was 39*l*. About 4,000 plants were given free of charge to purchasers of Crown lands. The estimated number of economic plants sold from 1889 to 1895 was 60,000.

250. It is desirable that a larger and more suitable piece of land be provided for experimental cultivation either in the neighbourhood of Castries or Soufriere. If it were possible to work such an experimental station by means of labour supplied by a reformatory or industrial school, as in Barbados, there would arise the

double advantage of training the boys in agricultural pursuits, and of raising crops of value to the island. New and improved canes might also be introduced and cultivated for distribution to the sugar estates. What is suggested, is not an expensive Government farm, but a simple and practical institution where economic plants could be experimentally cultivated on a larger scale than is possible at the present botanic station, and where the produce could be cured in such a way as to serve as object lessons to the peasant cultivators.

251. In some districts, as in the northern portions of the island where the land is undulating, cattle-raising may be carried on with success. The cattle required to supply the troops are at present imported from Porto Rico. The authorities have, however, agreed to accept local cattle provided they are of good weight and quality. Four pure-bred Zebu bulls were lately introduced to the island by the Agricultural Society, and it is possible that if special attention were devoted to the subject that most of the cattle required could be raised locally. The best tropical grass is the Guinea grass. This might be established in fenced pastures, and form a valuable food, especially during dry seasons. A demand is also arising for horses and mules. There are thousands of acres of land suitable for "breeding-pens" as in Jamaica. A stallion of good pedigree was introduced in 1896. It is stated that, as the result of the introduction of "Rosicrucian" in 1888 by the Agricultural Society, over 30 good foals were secured to the island.

Forest Lands.

252. Mr. Hooper, in his report on the forests of St. Lucia, is not apprehensive they will be destroyed to the same extent as in the other islands. He states "the peasant proprietor of St. Lucia is "not so wedded to the system of cultivating food crops on forest "soil as individuals of the type in other islands. He is prepared "to settle down on his own land and farm it, without the restless "nomad spirit that is common elsewhere. The system of non-"resident owners has had, perhaps, something to do with the "encouragement of such a feeling in Jamaica, but in St. Lucia it "is different, for the estates are lived on, or have been handed "down to their present owners in most cases, and with the "labourer this example has not been thrown away. As an "agriculturist he is far in advance of the coloured populace in "other more English islands, and he would not, when cultivating "near a forest, be such a constant danger to it as others who "steadfastly believe a fresh soil is alone fit to grow yams and "similar crops. Recent legislation, and the current of general "inclination, is in favour of constituting a more extended peasant "proprietorship, and I am certainly of opinion that the possible "drawbacks of such a policy are less in St. Lucia than in any other "islands I am acquainted with, and this is an important con-"sideration in the matter of forest conservation, as the two "matters are intimately connected."

253. In regard to the indigenous timber trees, Mr. Hooper's remarks indicate a possible opening for an export trade :—"In "composition the forests differ but little from those in the neigh- "bouring islands, but, as I have said, the deep soil allows of a "denser and a more diversified growth at higher and more "exposed elevations than in St. Vincent. The chief feature in "the tree-growth is the general distribution of Balata (*Mimusops*), "and other members of the natural orders *Sapotaceæ* and "*Laurineæ*. They are for the most part capable of yielding "valuable timbers, but hitherto the difficulty of transporting "timber from the interior to the towns has prevented their "assuming any value. It only needs the construction of roads, "and the adoption of special means of transport, to give a "distinct market value to the timber that is now considered an "encumbrance."

254. It should, therefore, be borne in mind in allotting Crown lands that it is most important to protect the forests with timber, and prevent them from being sacrificed to the first comer who may select heavily timbered land as the scene of his isolated cultivation. At the present time, satinwood is the only timber that is regularly exported from St. Lucia. What are described as "sizeable and figury" logs sell well and realise good prices. This timber tree might be specially protected on lands where it is at present established, and trees below a certain size should not be permitted to be cut down or exported from the island.

Crown Lands.

255. In the Crown Lands' Regulations, passed in Executive Council on the 5th November 1890, it is stated that "Sales of "Crown lands by auction shall be for cash, or on such other terms "and conditions as may with the approval of the Governor in "Council be specified in the notice of sale. In the case of "private sales, payments shall be by four equal annual instal- "ments, the first of which shall be one year after the date of "the deposit, and the others on the corresponding date in each "of the next succeeding years. To encourage the cultivation of "economic plants, the final payment will be returned to a certain "number of purchasers of Crown lands under these regulations "who are able to show good progress in this direction in the "fourth year after the date of the deposit."

256. Plants for cultivation on Crown lands are arranged to be provided from the Botanic Station free of charge. The number of grants of Crown lands, as already stated, is 253. It has been suggested in evidence that the conditions for acquiring these lands should be rendered still easier, and that the period during which payments may be made should be extended to 10 and not five years. The essential point is to secure that the lands are placed under permanent cultivation, as opposed to the spasmodic culti- vation of ground provisions. For the latter, land could be obtained in the neighbourhood of the sugar estates, and within easy reach of roads and habitations. There is apparently no

great difficulty in obtaining land in St. Lucia, for the population is a sparse one, and there are no large areas locked up in unproductive or abandoned estates as in St. Vincent. It is undesirable, therefore, to relax unduly the regulations for the acquisition of Crown lands until such time as there is actual need for the people to obtain them to keep themselves from actual privation. Such a contingency is a very improbable one in St. Lucia, whatever may be the case in the other islands.

257. Taken as a whole, the prospects of St. Lucia are more promising than of St. Vincent, and if there were a slight improvement in the price of sugar and cacao, the industries of the island would not require special attention beyond such active steps as may be necessary to improve the cultivation of the land and increase the efficiency of the cultivators. The teaching of, at least, the theory of agriculture in all elementary schools is the initial step in the progress of all subsidiary industries. Further, practical agriculture should be fostered in country schools, and one or two agricultural instructors trained under the Curator of the Botanic Station might be engaged to go through the rural districts to visit schools, and give practical demonstrations on peasant holdings, in growing and curing cacao, coffee, ginger, kola, and preparing and packing fruit.

VIII.—ST. VINCENT.

258. St. Vincent lies at the northern end of the Grenadine chain. It is 30 miles distant from St. Lucia, and 100 miles westerly from Barbados. It is slightly larger than Grenada. The total area, including its dependencies, is 93,987 acres (St. Vincent, 83,115, and the St. Vincent Grenadines, 10,872 acres). The whole island is of volcanic origin. The last eruption took place in the neighbourhood of Morne à Garou in 1812. A central ridge of mountains, some of the latter attaining a height of 3,000 ft., extends from north to south. From this numerous spurs spread on each side, running down to the sea. On the windward side there are portions known as the Carib country, with gentle slopes very favourably adapted for cultivation. The climate is comparatively cool and healthy. The rainfall is regular and plentiful; the average for the last five years is 113 inches. The island is well watered by numerous streams, and the soil is naturally fertile. There is a good road from Kingstown to the south and along the windward coast; on the leeward coast communication is by boat, and nearly all the produce is water-borne. It is estimated that 31,329 acres, or 33 per cent. of the total area, is in swamps or rocky and useless land.

259. The population according to the census of 1891 was 41,054, or 309 to the square mile. The white population numbered 2,445, or 6 per cent. Unindentured coolies are now employed on one estate only. A few Caribs still exist in the island.

260. The land in St. Vincent is held by a comparatively few people. According to the land roll, which includes assessments on holdings of one acre and upwards, the land is held approximately as follows:—There are only 351 holdings under 20 acres, covering a total area of 1,360 acres; 34 holdings over 20 acres and less than 50 acres, covering a total area of 1,060 acres; while there are 134 holdings of over 50 acres, covering a total area of 42,000 acres. In St. Vincent, therefore, while there are only 351 holdings under 20 acres, covering 1,360 acres; in Grenada there are 6,443 such holdings, covering 15,569 acres. It must also be remembered that in St. Vincent many of the holdings now existing may possibly have been established since the recent opening of the Crown lands. The situation is rendered still more difficult by the fact that of the considerable area, placed at 42,000 acres, in the hands of large proprietors, Sir Charles Bruce, in 1895, estimated that only 8,000 acres, or at the most 10,000 acres, were beneficially occupied. In considering the economic situation in St. Vincent, these circumstances connected with the distribution of the land must be carefully borne in mind.

261. The following table of exports will illustrate the position of the cultural industries during the last 15 years:—

Years.	1882.	1884.	1887.	1890.	1893.	1896.
	£	£	£	£	£	£
Collective sugar products	113,511	84,232	51,307	63,322	47,387	24,248
Subsidiary products	36,399	30,676	34,081	40,289	65,829	33,188
Total exports, produce of the Colony	149,910	114,908	85,388	103,611	113,216	57,436

262. In the above table it will be noticed that the value of the total exports of the produce of the Colony in 1896 was only 38 per cent. of what it was in 1882.

The growth of subsidiary industries from 1882 to 1893 was very satisfactory ; but owing to an excessive fall in the price of arrowroot in 1896, the value in that year fell to nearly one-half. The value of the principal exports in 1896 other than sugar, rum, and molasses, was as follows :—Arrowroot, 20,506*l.* ; cacao, 3,161*l.* ; cotton, 181*l.* ; firewood, 1,082*l.* ; ground-nuts, 312*l.* ; cattle, sheep, and pigs, 2,741*l.* ; whale oil, 580*l.* ; peas, 465*l.* ; spice, 679*l.* ; vegetables and fruit, 2,687*l.*

Sugar Industry.

263. The position of the sugar industry in St. Vincent, as shown by the above table, has been in a gradually decaying condition during the last 15 years. The actual number of estates now growing canes is not given. It is probably about 60. The area under canes in proportion to the total area of these estates is probably not more than 12 per cent. The largest proprietor in the island owns 21 estates, having a total area of 11,826 acres. The area now under canes is only 1,201 acres, or about 10 per cent. Professor Harrison, who has recently carefully studied the sugar industry in St. Vincent, states that on the majority of the estates the land appears to have been systematically starved for several years back ; while cane diseases, both borer and fungus, have also been more prevalent in St. Vincent than in any other part of the West Indies. As regards the cultivation, the manual part is not backward, but the manufacture of sugar Professor Harrison describes "as in a most deplorably backward state." He points out that the "crushing power of the water mills (almost universally "used) is very deficient. . . . . in the boiling-house little "care seems to be taken with the clarification of the juice, and "the sugar produced is of low quality." All the sugar is open pan or muscovado sugar, and is almost entirely shipped to the United States.

264. Professor Harrison is of opinion that "in certain districts "the erection of factories with modern appliances . . . . . "would pay during years of average price ; but in years when "prices are low, the erection of factories capable of making less "than 4,000 tons per annum would not be of advantage "..... the only district in which a factory of this "size could be worked is . . . . . the Carib country "..... the cost of such a factory would be 50,000*l.*" The total value of the produce under the present system is estimated at 20,400*l.*, while with a central factory it would probably be 29,650*l.*, or an increase of 9,250*l.* on the value of muscovado products.

265. It is stated by Professor Harrison that "the planters of "St. Vincent are handicapped by the fact that the Colony is too "small to justify the appointment of a resident chemist, and that "there is not any person resident in it who possesses the requisite

" knowledge to make accurate determinations of sugar for them. " The means for bringing the more immediately necessary " assistance in this direction to the planters have received very " careful consideration, and I suggest that Mr. Powell, the " Curator of the Botanic Station, should be allowed to receive " instructions in the examination of sugar products, and be " supplied with the necessary apparatus. During my visit to " St. Vincent, I formed a high opinion of Mr. Powell's abilities " and energy, and I believe that the adoption of this suggestion " would result in much benefit to the sugar industry of the " Colony."

266. Professor Harrison sums up as follows :—" The general " opinion I have formed regarding the sugar industry in St. Vincent " is that it is in a most critical condition, a condition accentuated " by the great prevalance of the moth borer and of fungoid " disease, and at the same time largely brought about by ill- " directed economy exercised during recent years . . . . . " on the other hand, I am satisfied that St. Vincent ought to be " able to produce a somewhat limited quantity of sugar at a cost " of production as low as, or possibly lower than, is attained else- " where in the West Indian Colonies."

Arrowroot and other Industries.

267. *Arrowroot* for a long period has been a staple industry of St. Vincent. The value of the exports has varied a good deal in recent years. In 1892 the value was 61,313*l*., but since that time it has steadily declined. In 1896 it was lower than in any year since 1880, and reached only 20,506*l*. A detailed inquiry was made at Kew into the circumstances of the arrowroot industry in St. Vincent, and the report was published in the *Kew Bulletin*, 1893, pp. 191–204. It is probable that in some cases the soil has been exhausted, and in others that the process of manufacture has not been maintained at so high a standard as formerly, or both these circumstances may have operated concurrently. Only two or three estates in the island now devote themselves to preparing really first-class arrowroot, the others prepare an inferior quality which hardly pays the cost of production. A firm of brokers in the city lately expressed the opinion that "during the last few " years there has been a considerable falling off in the quality and " appearance of St. Vincent arrowroots, so much so that they have " now reached the low level of inferior brands. In other words, " they have entirely lost their reputation."

268. The great fall in prices in 1896 is attributed to over-production. Many sugar estates undertook the cultivation of arrowroot instead of canes. The price at present for low grades is only about $1\frac{1}{4}d.$ per pound. If the arrowroot industry is to exist at all, the planters must energetically grapple with the situation and realise that the matter is practically within their own control. Possibly less arrowroot must be produced, but the quality must be improved so as to reach the standard formerly attained.

269. *Cacao* cultivation has been largely extended of late years. The exports are still small but are steadily increasing. The value of the exports in 1880 was 641*l*., in 1890 1,835*l*., while in 1896 (in spite of exceptionally low prices) it reached 3,161*l*.

270. *Coffee* and *Spices* are also being grown. The value of the spices, chiefly nutmegs and mace, exported in 1895 was 1,812*l*.

Botanic Station.

[Amongst the Botanical stations started in the West Indies (*Kew Bulletin*, 1892, p. 90), there is none invested with so much interest as the Station established in the island of St. Vincent.

The object was to provide a small but efficient centre for propagating and distributing industrial plants, and to afford aid and information in regard to their cultivation in suitable localities in the island. The site of the station was that occupied by the old botanical garden of St. Vincent, begun so long ago as 1765. This was the first institution of the kind started in the West Indies and possibly in any part of the new world. There are several very old botanical establishments in the West Indies. The Jamaica Botanic Garden at Bath was established about 1774, and the botanic garden at St. Pierre, Martinique, according to the *Annuaire de la Martinique*, 1884 was established "30 *pluviôse an xi.* (19 *fevrier* 1803)." Anderson, in one of his letters from St. Vincent, dated 20 November 1786, refers to another—the "French King's Garden at Cayenne" (French Guiana). The Trinidad Botanic Garden appears to have been established a little before or about the time of the removal of some of the plants in the St. Vincent garden to Trinidad in May 1823.

The history of the old botanic garden of St. Vincent is well preserved. The most complete account of the institution is given by the Rev. Lansdown Guilding, B.A., F.L.S., who resided for many years in the island, and who was well acquainted with its fauna and flora. Mr. Guilding's botanical collections are in the Kew Herbarium, and they were utilised in the preparation of the *Flora of the British West India Islands* by Dr. A. H. R. Grisebach, in 1864. Mr. Guilding's account of the St. Vincent garden, published in 1825, is a quarto pamphlet with four coloured plates, dedicated to Sir William Hooker when Regius Professor of Botany at Glasgow. The coloured plates consist of : (1) a view of the house of the Superintendent ; (2) a view of the garden looking from the Superintendent's house in the direction of Kingstown ; (3) a view in the garden from the bottom of the centre walk or avenue ; (4) a diagram of the garden showing the original land and the additions made a few years later.

The situation of the garden was a sheltered rich valley, with a perennial stream running through it. It was less than a mile distant from Kingstown, the capital, and it was well adapted in every way for purposes of cultivation.

According to Guilding the garden was 39½ acres in extent, and maintained entirely from Imperial funds.

Further, "so great was the interest taken in it, that His Majesty (George III.), was pleased, in 1790, to send the "Bounty" to the South Seas to procure for it the bread-fruit (*Artocarpus incisa*) and every other valuable tree that could be obtained. The lamentable termination of this first voyage is known to everyone . . .

"Not discouraged by the fate of the first, the King determined to fit out a second ship of discovery, and shortly afterwards Captain Bligh set sail in the 'Providence' . . .

"In December 1792 Captain Bligh touched at St. Helena on his return, and in January 1793 attended by Captain Portlock of the 'Assistant' brig, landed the best portion of his valuable cargo, about 530 plants, on the shores of St. Vincent. The young trees, which were as vigorous as if they had only travelled from our mountains, instead of having crossed a wide and troubled ocean, were instantly planted out, and after a proper interval distributed among the colonies. Having performed this duty, Captain Bligh proceeded to Jamaica, where another portion was delivered, and with the remainder (destined for His Majesty's gardens at Kew) set sail for Europe.

"The total number of plants delivered amounted to 1,217; besides there were 700 reserved for Kew. In 1794 the bread-fruit began to bear.

"In 1798 a catalogue was made of all the plants within the garden area, conveniently arranged; and another was published by the Society of Arts in the 25th volume of their transactions.

"In 1803, 10 acres were taken from the adjoining Crown lands, commonly called the Barrack land, and added to the garden.

"Mr. Lochead, who afterwards succeeded Dr. Anderson, had obtained from Cayenne several Nutmegs and other plants which he had nursed in Trinidad with the greatest care. These, in 1809, were introduced by Captain Dix of His Majesty's sloop 'Cygnet,' who readily undertook the charge of them by permission of Admiral Cochrane, who then commanded on the station. These trees have borne well for many years, and considerable nurseries are established both here and in Trinidad."

In 1816, Mr. George Caley, who had been successfully engaged in making botanical collections in Australia, was appointed to succeed Mr. Lochead. This appointment was not a fortunate one, and led ultimately to the abandonment of the garden. Mr. Caley resigned in 1822, and the establishment was removed in the following year to Trinidad. Although neglected for nearly seventy years, "nothing could prevent from flourishing the few beautiful trees that still ornamented the ground." Amongst these were the canon-ball tree, several fine trees of nutmeg, the Cohune palm of British Honduras, the teak, betel-nut palm, and a singularly interesting species (*Cutostemma fragrans*) a native of the forests of Guiana. Many of these still remain and are of majestic size.

The present Station owes its existence to the well-directed efforts of the Hon. Sir Walter Hely-Hutchinson, G.C.M.G., Governor-in-Chief of the Windward Islands in 1889–93.

Mr. Henry Powell, a member of the gardening staff at Kew, was appointed the first Curator, and arrived in the island in May, 1890. He still remains in charge. The station was visited by the writer in December of that year, "and since that time the suggestions offered to the Government for laying it out and devoting it to the discharge of the special functions assigned to it in developing the resources of the island, have been steadily and intelligently carried out."

As already indicated, the Rev. Lansdown Guilding's account of the Botanic Garden in St. Vincent (Glasgow, 1825) is an interesting and valuable record. It treats of the introduction of numerous economic plants, and especially of the bread fruit and nutmeg trees.

More recent information is contained in the following :—

Gore, A. F. Description of St. Vincent (with list of Exhibits). Indian and Colonial Exhibition (pp. 62–72), London, 1886.

Report upon the Forests of St. Vincent, by E. D. N. Hooper, of the Indian Forest Department. Colonial Office, 1886.

Historical and Descriptive Sketch of the Colony of St Vincent, by T. B. C. Musgrave. Jamaica Exhibition, 1891.

Botanical Enterprise in the West Indies, St. Vincent. D. Morris. *Kew Bulletin*, 1891, pp. 140–145.

Flora of St. Vincent and adjacent islets. *Kew Bulletin*, 1893, pp. 231–296.]

272. *Fruit* has not been regularly cultivated for export. The circumstances of St. Vincent so closely resemble those of Jamaica that it is probable that most of the products found profitable in Jamaica would be equally successful in St. Vincent. If rapid and regular communication could be established between St. Vincent and New York, there is little doubt that sufficient bananas could be cultivated in the island to support a trade in fruit. This subject is more fully discussed under Dominica, which might also contribute a share of the bananas necessary to supply the cargo for one ship. The fruit trade industry is at present the only means I can suggest for creating an immediate improvement in the circumstances of the labouring classes in St. Vincent. There must, however, be experienced persons placed in charge of it, and the people wishful to take it up must be required to place a certain area under cultivation before the shipping facilities are actually provided. I should estimate that at least 2,000 acres would be required to be established in cultivation before the trade is started. In the meantime every effort must be made to obtain land for this and other cultivation accessible to roads and shipping places.

Crown Lands.

273. Considerable effort has been made by the Government to render the Crown lands of St. Vincent available for cultivation. These lands occupy the whole of the interior of the island, and

between them and the coast is a belt of private lands more or less occupied in sugar cultivation. As a first step the boundary line between the Crown lands and the adjacent estates had to be defined. This occupied several years and cost the Colony a considerable sum, which should eventually come back in the sales of allotments. A Crown Lands Department was organised to look after the settlements and assist in their development. The lands were sold in lots of not less than five acres, at 30*s.* per acre in cash, or at 40*s.* per acre if paid in five yearly instalments. The purchaser was required to plant at least one half of the area of the land in products of a permanent character, such as cacao, coffee, and spices. Failing this (or to pay any instalment when due) the Government had the right to cancel the agreement and re-enter upon the land.

274. For the last six years the work of opening the Crown lands has been steadily pursued. Numerous lots have been taken and cultivation has been started upon them. Latterly, however, as mentioned by Sir Charles Bruce in the Blue Book Report of 1895, "the low price of stock and agricultural produce has "seriously affected the revenue of the Crown Lands Department. "Purchasers of small holdings under the Crown lands scheme, "which provides for payment by instalments, have been unable "to meet their liabilities, the result being large arrears of instal-"ments, dating back in many cases to the vear 1893. The "Superintendent of Crown lands is of opinion that where instal-"ments have been paid they have been, to a large extent, paid "from wages earned out of the Colony, or by sale of stock, and "not out of the profits of the cultivation of the land."

275. Another important factor, according to the evidence, that has led to the practical failure of settlements on the Crown lands has been the loss of wages consequent on the retrenchments effected on the sugar estates. The settlers relied in many cases on the money received in wages to pay the instalments due on their holdings, and also to help to support their families during the time the crops were growing. It is recorded that not only have wages been considerably reduced on the sugar estates, but employment has only been given for 10 to 12 days per month, while numerous persons have failed to get any employment at all. Added to this, disastrous floods occurred last year in the districts where the allotments were situated, and great injury was done to the cultivation.

276. At present it is admitted that the Crown lands scheme is in a very unsatisfactory condition. The arrears of instalments unpaid at the close of 1895 amounted to 1,048*l*. The services of the Superintendent of Crown Lands are no longer available from want of funds; and hence, unless some special effort is made to reorganise the department on a more workable basis, the good already done in settling the Crown lands wlll be practically lost.

277. In his last report the Superintendent of Crown Lands points out the urgent necessity for (1) the immediate completion of the definition of the Crown boundary lines; (2) the opening of roads to the Crown lands; and (3) the instruction of pur-

chasers in the best methods of planting, pruning, and shading the various economic plants established by them. "Such a "course," he says, "will make all the difference between success "and failure in the case of hundreds of acres now being "energetically, but unwisely, cultivated."

278. From their position and character the development of the Crown lands in St. Vincent must always present considerable difficulty. They are remote from all the present habitations and all existing roads. They are often on steep hill slopes, difficult of cultivation, and liable to be washed away during exceptional rainy seasons. A road is now in course of being made into some of the Crown lands, and it is proposed that instruction shall be given to the "small holders in the art of turning their land to "profitable account by improved methods of cultivation." The services of the Curator of the Botanic Station have hitherto been given in this direction, but it is now necessary to provide instructors regularly devoted to this work.

Unproductive Private Lands.

279. There is another side to this question. There are thousands of acres of unused land attached to the present sugar estates, or abandoned estates themselves, that possess a rich soil, and are within easy reach of habitations and accessible by roads and paths already existing. Prominent instances are the three large estates just outside the capital of the island, formerly in sugar, but now practically abandoned and lying useless. The holders of these and similar lands at present refuse to sell, and in the present condition of the sugar market they are unable to cultivate them. "It is difficult," as Sir Charles Bruce remarks, "to force the action of the proprietors of great estates," but it is inevitable that some measures must be taken to utilise some portion at least of the large areas now unprofitable, and place them under such cultivation as will save the people from actual starvation.

IX.—DOMINICA.

280. The picturesque and interesting Island of Dominica contains 291 square miles, and is therefore more than twice the size of either St. Vincent or Grenada. It is the largest and most southerly of the group forming the Federal Colony of the Leeward Islands, and lies exactly midway between the French Islands of Martinique and Guadeloupe. The surface is very mountainous, with steep cliffs, especially on the Windward Coast, reaching to the water's edge. It is of volcanic origin, and active volcanic agencies are still to be found in the hot sulphur springs and a boiling lake. It is abundantly clothed with vegetation, and there are numerous streams. Viewed from the sea, the island has a singularly bold and striking appearance, with dark irregular masses of lofty mountains (4–6000 ft.) abruptly rising as if out of the sea. The coast line, 100 miles long, is here and there indented, but Rupert's Bay, in the north-west, is the only considerable harbour. The rainfall is abundant and regular; the mean rainfall for the year 1889 was 120 inches; in 1892, based on returns from 12 stations, it was 118 inches; while in 1896, on returns from 20 stations, it was 126 inches. There was an extraordinary rainfall in the latter year at Roseau, where 77 inches were recorded in the month of November alone. The mean annual temperature at Roseau, on the coast, is 79°; the average maximum 84°, and the minimum 75°. The nights are invariably cool.

281. The total area is given as 186,240 acres. In private hands there are said to be 60,000 acres, leaving about 126,000 acres as the estimated area of the Crown lands. If from the latter is deducted 46,000 acres, the estimated area in swamps, rocky and other useless land, we have left 80,000 as the net estimated area of Crown lands suitable for cultivation. Most of this cultivable land is at an altitude from 250 to 3,000 feet above the level of the sea. At present it is covered with forest containing valuable timber trees. The estimated area now under cultivation is 30,000 acres, or less than one sixth of the total area. If the system of main roads now in contemplation were fully carried out, it is stated that all the cultivable lands would be accessible within 6 or 8 miles of a main artery. At present there are only 25 miles in the island suitable for wheeled traffic; beyond these are somewhat steep bridle paths which communicate with most of the out-stations. Produce from the Windward side to Roseau is chiefly water-borne.

282. Sir Robert Hamilton, in his report on the condition of Dominica in 1894, drew special attention to the unsatisfactory condition of the tenure of land in the island: "It is, in fact, in a "state of chaos . . . there is no proper and complete record "of Crown lands nor of private estates . . . the Government "have no means of knowing whether the lands on which many "persons are living are their own private property or whether "they are the property of the Crown." He suggested that a properly qualified surveyor should be at once appointed, and efforts made "to introduce some sort of order into this important "matter of administration."

283. According to the census of 1891, the population was 26,841, or 1,370 less than in 1881. The white population was 330 (or a little over 1 per cent.), with 7,000 coloured and 19,700 black people. There were 309 descendants of the original Carib inhabitants still existing on a reservation on the Windward Coast. The bulk of the people are peasant proprietors, living within a mile or two of the coast. Two thirds of the population live on the Leeward side of the island, where Roseau, the capital, with 5,000 inhabitants, and Portsmouth, or Prince Rupert's, 20 miles further north, with about 1,500 inhabitants, form the centres of commercial activity. About 90 per cent. are Roman Catholics, and at least two-thirds of the population speak a French *patois*.

284. Of late years large numbers of men have emigrated to Venezuela and Cayenne to work in the gold mines. It was estimated that in 1892 there were about 7,000 Dominicans in a poverty-stricken condition in Venezuela who wished to return to their native country. In spite of this, emigration still continues, and according to returns furnished by the Administrator, 1,284 persons left for Venezuela and Cayenne in 1896.

285. The total value of the imports of Dominica during the year of 1896 was 57,262*l.*; of the exports 48,973*l.* Among the exports the following were the principal articles, with their values:—Sugar, 7,554*l.*; limes and lime-juice, 14,851*l.*; cacao, 13,453*l.*; fruit and vegetables, 1,348*l.*; arrowroot 20*l.*; sulphur ore, 775*l.*; logwood, 132*l.*; firewood, 691*l.* Apparently no rum and no molasses were exported in that year.

Sugar Industry.

286. The products of the sugar-cane form at present only a small share of the total exports from Dominica. There are only two exclusively sugar estates now in cultivation, and these, with part of a third, are being worked as one property. The aggregate area under canes is 975 acres. Muscovado sugar is produced on several properties, along with cacao, limes, and other products. There are five properties where rum is distilled. This island was one of the first to feel the fall in prices. Most of the large estates belonged to absentee proprietors, and both the cultivation of the cane and the manufacture of its products were carried on in a primitive and wasteful manner. As described by Dr. H. A. Alford Nicholls, C.M.G., "the common muscovado sugar was the "only kind made . . . . and the employment of scientific "principles in the manufacture of a high grade product was "unheard of . . . . the largest properties did not turn out "on an average . . . 200 hogsheads of sugar . . . . the "multiplicity of small factories and the wasteful methods "adopted enhanced the cost of production, and . . . . the "industry could not stand against depressed prices." Sugar was also produced by small settlers, but eventually they also had to abandon cane cultivation, and much of the land occupied has since reverted into bush.

287. The following table will illustrate the position of the sugar industry as compared with other industries during the last seven years :—

Years.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
	£	£	£	£	£	£	£
Collective value of the exports of sugar, rum, and molasses.	17,571	10,327	17,108	13,264	8,738	6,485	7,554
Per cent. of total exports	43	27	39	26	24	17	15
Value of exports other than sugar	23,538	28,054	26,746	38,067	27,642	30,647	41,419
Total value of exports, produce of the Colony.	41,109	38,381	43,854	51,331	36,380	37,132	48,973

288. The value of the collective exports of sugar, rum, and molasses has therefore fallen from 17,571*l.* in 1890 to 7,554*l.* in 1896, and now only represents 15 per cent. of the total exports of the island. On the other hand, the value of exports other than sugar, viz., cacao, limes and lime products, coffee, bay leaves, essential oils, fruit, and vegetables has increased (in spite of exceptionally low prices) from 23,538*l.* in 1890 to 41,419*l.* in 1896, and represent 85 per cent. of the total exports. The export of sugar in 1896 consisted of 616 tons of raw or muscovado sugar and 229 tons of centrifugal. Of rum 28,152 gallons were produced, but none exported.

289. There are many valleys in Dominica where sugar could be grown very advantageously if prices were to improve. The land is naturally fertile, and the seasons are favourable for raising good crops. The same remedies have been recommended here as in the other islands, viz., money at a low rate of interest to erect factories, and capable men to manage them. Cane-farming was suggested as likely to be successful in certain localities, but "to "give the farmer his fair share in the profits of his labours, he "ought to be the only shareholder in the factory." The experience in Guadeloupe, Santa Cruz, and other islands has been that "the "factory has swallowed up the farm." In other words, part of the profits from the factory have been applied in advances and loans to make good the losses of the cultivators, with the result that the cane-farmer has been reduced to the position of a mere labourer working on the factory lands. This is an obvious defect in the cane-farming system, and it can only be overcome by the cane-farmers themselves co-operating to erect a factory, and sharing between them the profits of manufacturing the sugar as well as those earned by growing their own canes.

Lime Industry.

290. The most flourishing industry in Dominica is the production of lime juice and other preparations from what is known as the West India lime—a small acid fruit allied to the lemon. This variety is more widely cultivated in Dominica and Montserrat than in any other part of the world. Dominica limes are large and juicy, the trees are perfectly healthy, and within such limits as are imposed by the commercial demand for the produce, the

industry deserves to be extended. The acid juice of the lime is more grateful than that of the lemon, and, where obtainable, it is preferred for flavouring in cookery and in the preparation of acidulated drinks. Amongst the various articles obtained from limes are (1) the raw lime juice, extracted by pressure from the ripe fruit; (2) concentrated lime juice made by boiling the raw juice until it acquires the consistency of molasses, the amount of concentration is usually 12 to 1; (3) essential oil of limes, obtained by distilling the skimmings of the raw juice; (4) otto of limes, a superior essence extracted by slightly bruising the outer surface of fresh ripe limes: and (5) pickled limes, preserved in salt water or water. The fresh limes themselves are also exported to a small extent. A full account of the West India lime and its uses are given (with a plate) in the *Kew Bulletin*, 1894, pp. 113–6. Dr. Nicholls has kindly furnished the following particulars of the industry and its present position in Dominica: "For a considerable "time after the establishment of the lime industry raw juice was "not exported in any large quantity, but within recent years it has "figured in the list of exports. In 1883 only 1,315 gallons, valued "at 21*l.* 18*s.* 4*d.*, were shipped, whilst last year 107,344 gallons, "valued at 3,578*l.* 2*s.* 8*d.*, were sent away from the island. "Messrs. Rose & Co. have bought recently a fine lime property in "the island, and, as they are extending the cultivation rapidly, "the exports of raw lime juice will soon increase in quantity." Another lime product is lime fruit pickled in brine. These "pickled limes" are held in much estimation in some of the New England States of America. Last year 1,572 barrels were shipped, and they were valued at 569*l.* 17*s.*

291. The increasing importance of the lime industry to Dominica is seen from the following Table, showing the quantities and values of the lime exports during the years 1883 and 1896:—

—	Exports in 1883.				Exports in 1896.			
	Quantity.	Value.			Quantity.	Value.		
	Gallons.	£	*s.*	*d.*	Gallons	£	*s.*	*d.*
1. Raw lime juice	1,315	21	18	4	107,344	3,578	2	8
2. Concentrated lime juice	22,370	4,597	18	4	50,367	10,702	19	0
3. Essential oil of limes ...	294*	177	0	0	1,265½	1,993	3	3
4. Otto of limes					677	1,370	18	6
					Barrels.			
5. Lime fruit	Nil.	—			4,036	706	6	0
6. Pickled limes	Nil.	—			1,572	569	17	0
Total values... ..	—	4,796	16	8	—	18,921	6	5

* In the year 1883 the two kinds of essential oils were not discriminated in the table of exports.

Coffee.

292. About 50 years ago Dominica used to produce large quantities of excellent coffee. The exports are stated to have

reached 6,000,000 lbs. in a single year. The decline of coffee cultivation in Dominica is variously attributed to political disturbance, the attacks of the "white fly," restrictions of the slave trade, and the superior profit arising from sugar. None of these can be said to be operative at present. The "white fly" is known to attack Arabian coffee only when it is cultivated at a low elevation. Above 2,000 feet the fly causes no anxiety, as it appears not to flourish in moist mountainous districts. Moreover, the fly does not affect Liberian coffee, which can be cultivated from sea level up to the point where the Arabian coffee begins.

293. Of late years planting has been taken up in many districts with marked success, and coffee once more appears in the list of exports. The coffee exported during the last six years is as follows :—

Year.	1891.	1892.	1893.	1894.	1895.	1896.
Quantity (lbs.)	7,420	22,020	8,890	14,264	19,020	25,786
Value (£)	240	734	333	536	713	967

294. The Administrator (P. A. Templer, Esq., C.M.G.), formerly of the Ceylon Civil Service, placed before the Commission the following particulars respecting the prospects of the cultivation of Arabian coffee on large estates by European planters in Dominica :—

"While recently on leave in England, I took the opportunity of "consulting many old Ceylon coffee planters whom I met as to "the cost of opening forest land and bringing it into cultivation "with Arabian coffee. I was told that 20*l.* to 25*l.* per acre added "to the original cost of the land would be a liberal estimate. "Taking the higher figure for Dominica, but including in it the "purchase price of land (even at 2*l.*) an estate of 300 acres— "assuming the whole of it to have been opened and planted at "once—would, at the end of four years, when it would be in "bearing, have cost 7,500*l.* To this must be added, say, 2,500*l.* "for buildings, machinery, and stock, and the capital invested "may be set down at 10,000*l.*; 5 cwt. of clean coffee to the acre is "not an extravagant estimate (some of the Montserrat Company's "land in Montserrat gives 14 cwt. per acre), and taking 90*s.* per "cwt. as a fair price for good plantation coffee, the gross yield on "300 acres would be 6,500*l.* Allowing 4,500*l.* a year for cost of "cultivation (including management, transport, freight, export "duty, and agency, and counting labour at one labourer for every "acre, getting 10*d.* a day and working four days a week), the "balance, 2,500*l.*, presents a very fair return for the capital "invested, even when due allowance is made for bad seasons and "occasional failure of crops."

295. Liberian coffee was introduced into Dominica about 25 years ago, and is well adapted to the soil and climate. The Curator of the Botanic Station states : "The various trials and "experiments that have been made with this plant since its "introduction show that it can be cultivated from sea-level up

" to 1,500 feet elevation." The plants under experimental cultivation at the Station produce large crops, and everywhere they are vigorous and perfectly healthy. According to Dr. Nicholls. there is now a considerable area under young Liberian coffee, and in a few years its beneficial influence on the exports will be manifested.

Cacao.

296. The cultivation of cacao is next in importance to that of limes, and the produce promises to become an important article of export. Dr. Nicholls gives the following brief notice of the industry as now existing in the island :—

" As sugar declined in value, cacao happily rose in price, and " its cultivation was taken up by many persons when the sugar " estates began to fail. Unfortunately, the worst variety of the " cacao tree—the calabash or 'calabacillo '—was established in the " island, and the produce therefore realised very low rates in " the great markets. In recent years, however, more attention " has been directed to the selection of seeds and plants, and now " higher prices are given in the home markets for the better " kinds of Dominican cacao. The Botanic Garden has done " some very useful work in this direction, for planters eagerly " buy up the seedlings raised there, and the Curator wisely takes " particular care to sow none but the best kinds of seeds. It is " satisfactory to notice that the exports of cacao are gradually " increasing. In the year 1883 the export of this staple amounted " to 473,355 lbs., valued at 7,889*l*., whilst last year close upon a " million pounds were sent away from the island, the actual " figures being 993,456 lbs., valued at 13,453*l*. The output may " be expected to increase considerably in a few years, as much of " the cacao cultivation has not reached the bearing stage."

297. The following Table indicates the prices obtained for Dominica produce in the London market during the last six years :—

Year.	Cacao. Per Cwt.	Raw Lime Juice. Per Gallon.	Concentrated Lime Juice. Per Hhd. of 52 Galls.	Distilled Oil of Limes. Per Pound.	Essential Oil of Limes. Per Pound.
1891	53*s*.—60*s*.	1*s*.—1*s*. 3*d*.	17*l*.—18*l*.	1*s*. 5*d*.	—
1892	62*s*.—67*s*.	11*d*.—1*s*. 3*d*.	17*l*.—18*l*.	1*s*. 8*d*	8*s*. 6*d*.
1893	60*s*.—64*s*.	1*s*.—1*s*. 2*d*.	14*l*. 10*s*.—15*l*.	1*s*. 8*d*.	8*s*. 9*d*.
1894	48*s*.—56*s*.	11*d*.—1*s*. 2*d*.	12*l*.	1*s*. 7*d*.	6*s*. 6*d*.
1895	43*s*.—50*s*.	9*d*.—1*s*. 1*d*.	12*l*. 12*s*. 6*d*.	1*s*. 9*d*.	4*s*. 9*d*.
1896	40*s*.—46*s*.	9*d*.—1*s*. 1*d*.	12*l*. 15*s*.	2*s*. 8*d*.	4*s*. 7*d*.

This table shows that nearly all the produce exported has fallen considerably in value during the last six years, and it emphasises the necessity for greater economy and skill in cultivation, and for introducing the best labour-saving machinery for preparing the produce.

Fruit Industry.

298. According to the *Kew Bulletin*, 1888, p. 197, "from the "time of its settlement Dominica has been justly celebrated for "its fruit. Of all the British Possessions in the Lesser Antilles, "it is now regarded as having the best promise of a large and "remunerative trade, not only with the United States and Canada, "but with Europe." Again, "possessing a fertile soil unsurpassed "in any other part of the world, an abundant rainfall, and a wide "diversity of climate . . . the capabilities of Dominica for "the culture of tropical and subtropical fruits can scarcely be over "estimated." The chief fruits exported are oranges, bananas, mangoes, shaddocks, and pine-apples. To start a fruit trade in bananas, for instance, with the United States it is necessary to establish a sufficient area to supply an appreciable number of bunches every week or fortnight. The Jamaica banana has already been introduced into Dominica, and it may be readily distributed all over the island. If suitable means of communication were established between Dominica and New York, by a line of subsidised steamers calling at regular intervals, there is little doubt a very great impetus would be given, not only to fruit growing, but to numerous other industries. Banana trees are necessary as shade for nearly every tropical plant in its early stages of growth. If an appreciable return could be obtained from the shade trees the cost of establishing areas in coffee, cacao, spices, and other plants would be greatly reduced, if not entirely covered. I regard, therefore, the existence of a well sustained fruit trade as the first step in the further expansion of minor industries in Dominica. This view is strongly supported by the course of events in Jamaica, and possibly no island, except St. Vincent, so closely resembles Jamaica in its physical features as Dominica. If provision could be made for a subsidy to provide shipping facilities for St. Vincent and Dominica the small cultivators in these islands could furnish sufficient fruit to fill at the end of two years one ship in a fortnight, and at the end of three or four years one ship a week. It would be desirable to make an inquiry in regard to the amount of the land that could be immediately planted with the right sort of bananas, and the approximate yield at the end of successive years. The subsidy would have to be paid for a fixed period, say five or seven years, and arrangements made for the ships to leave direct for New York on the evening of certain days, decided upon beforehand, throughout the year. It would be necessary also that telephonic communication be provided between the different districts engaged in the fruit trade, and a regular tariff of prices agreed upon, in accordance with the size and quality of the bunches supplied.

Botanic Station.

[The Botanic Station has already been referred to. The first steps were taken at the close of the year 1889, but it was not until January, 1891 that the land which now forms the Station was actually in the possession of the Government. Previously small nursery had been established in the grounds of Government House. The late Superintendent of Agriculture stated :

"The founding of the Botanic Station in Dominica will probably, it future years, be referred to as one of the greatest strides in the progress of the island during recent times." As shewn later, the Station has distributed during the last six years 165,000 economic plants, or an average of 29,000 per annum. The cost of the Station in 1896 was £400, while the net receipts for plants sold were £99.

The Station lies immediately at the back of the town of Roseau, and about half a mile from the landing place. It is on the right-hand side of the public road leading up the Roseau valley, and terminates near the first bridge over the Roseau river. Immediately above the land, to the south-west, is the Morne, an elevated plateau about 500 feet above the level of the sea. On the edge of the Morne, overlooking the Station, are precipitous cliffs, and at the foot of these are easy slopes, suitable for cultivation. The land is undulating, with a rich sheltered hollow immediately under the Morne. In other places the soil is somewhat stony, and not so suitable for the growth of plants. There is, however, no part of the land not suitable for some cultivation or other. The site is well sheltered from prevailing winds to the south and east. On the northern side it is somewhat exposed and will require to be protected by a belt of trees. An abundant supply of water is available from the mains of the Roseau reservoir. These pass through the middle of the land.

It was pointed out (*Kew Bulletin*, 1891, p. 119) that the objects in view in establishing this Station were strictly experimental and economic. Ornamental plants were to be grown in moderate quantities for rendering the grounds attractive and interesting, but chief attention would be devoted to plants of an economic or industrial character, and especially those likely to be in demand for establishing new plantations in Dominica. Again, the more the cultural operations of every kind were carried on as object lessons for the instruction of the people, the better would the Station fulfil its mission as a factor in the development of the resources of the island. A large number of very useful and interesting plants already existed in the island at St. Aroment, the property of Dr. H. A. A. Nicholls, C.M.G. These had been sent out from time to time from Kew, to the late Dr. Imray and Dr. Nicholls, in exchange for Dominica plants kindly contributed at the private expense of these gentlemen. This collection was one of the best in the Leeward Islands. A list of the plants was given in the *Kew Bulletin* for 1887, pp. 10–12. Dr. Nicholls still takes a deep interest in everything connected with the development of Dominica, and he has contributed numerous cuttings, seeds, bulbs, and plants from St. Aroment for the purpose of establishing the Station and for distribution in the island.

The first Curator was Mr. Charles Murray, from the Edinburgh Botanic Gardens, appointed September 9th, 1889. He was soon after transferred to Grenada. Mr. Henry F. Green was appointed to succeed him, August, 1890. The work of laying out the ground of the present Station was carried out by Mr. Green, and he also took a deep interest in forming the present successful plots of

economic plants. Mr. Green resigned in February, 1892, to take charge of a private enterprise in the north of the island. Afterwards he became Superintendent of the Reformatory School at Roseau, until it was abolished in 1896. The next Curator was Mr. Joseph Jones, who had been trained at Kew. He arrived in the island in March, 1892. Mr. Jones immediately took up the duties of his office with energy and enthusiasm and he has proved an excellent Curator. It is stated in evidence that he has rendered "services universally acknowledged by the planters of the island."

The folowing particulars respecting the distribution of economic plants from the Station were placed before the Commission by the Curator :—

"The chief object of the garden has been to raise and distribute at cheap rates economic plants. That this work is gradually developing will be seen by the following table, giving in round numbers the yearly distribution of plants since 1891 :—

1891	9,000	plants	distributed.
1892	17,000	"	"
1893	22,000	"	"
1894	30,000	"	"
1895	36,000	"	"
1896	42,000	"	"
1897 to date (March 10th) ...	9,000	"	"

"The above are all economic plants; no attention is paid to raising ornamental plants. Plants are charged at very low rates, in most cases below the actual cost of production. For example :—

1. Cacao plants in pots, a little over a farthing each.
2. Coffee plants from the beds, packed for distribution, less than a farthing each.
3. Nutmeg plants about 18 months to 2 years old, in pots at 1*d.* each.

"Up to the present, the great demand has been for Liberian coffee—a promising industry, and one very suitable for Dominica. Over 75,000 plants have been distributed altogether, and the demand continues to increase. The remaining plants sent out consist of coffee, limes, cacao, oranges, kola, nutmegs, small quantities of vanilla, a few plants of two new varieties of coffee for experimental cultivation, fruit trees, &c.

"Of the above, only a very small proportion has been sent out of the island, the number averaging 1,000 yearly. Applications for plants are sometimes numerous from the northern islands, but only surplus stock can be supplied to them, as priority must be given to local demands.

"The distribution of seeds has also been large; no less than 2,233 cacao-pods of good varieties, capable of yielding 44,660 plants, having been sent out to local planters during the past three years, as well as quantities of Blue Mountain coffee-seed, kola, and Liberian coffee-seed.

"Other important work is also carried on at the garden. One object is to bring together a collection of plants, especially those of economic value. In many cases it is only possible to obtain a single plant, and this has then to be cared for till it arrives at maturity, when it can be propogated and distributed.

"At present, the garden contains many valuable plants, among which may be mentioned fruit trees from the east, rubber trees, ramie, two new varieties of coffee, fibre plants, and others which may prove useful.

"Small experimental plots of various economic plants have also been started, and will prove highly interesting.

"The outlook for the present year is promising as regards sale of plants. The number on order at present is over 30,000. So far there is no sign of any diminution in the demand for plants. It will be observed that there is a considerable variety in the plant distributions, and this is as it should be, for Dominica is capable of supporting a varied agriculture.

"It is hoped that an influx of capital will now commence, and enable old industries to be extended and new industries to be started, and thus open to Dominica an increase of prosperity."

What is required is to extend the work of the Station, employ agricultural instructors to visit and encourage the cultivators, and establish an industrial school at which boys could be trained in agricultural methods. Particulars of a scheme in this direction are given in the Appendix.

The following are the principal publications relating to the botanical and agricultural resources of Dominica:—

Prestoe, Henry. Report on the Coffee Cultivation of Dominica. 1875.

Johow, F. Vegetationsbilder aus Westindien : eine Excursion nach dem kochenden See auf Dominica, "Kosmos" ii., 1884, pp. 112-130, 270-285. Abstract in 'Engler's Jahrbucher, vii. (1886), 'Literaturbericht,' p. 76.

Churchill, J. Spencer. Description of Dominica (with list of Exhibits.) Handbook of the West Indies. Indian and Colonial Exhibition (pp. 114-133). London, 1886.

Nicholls, H. A. A. The Natural Resources of the Layou Flats in the Island of Dominica. Handbook of the West Indies. Indian and Colonial Exhibition (pp. 120-126.) London, 1896.

Nicholls, H. A. A. Fruits of Dominica. *Kew Bulletin*, 1888, pp. 197-214.

Morris, D. Botanical Enterprise in the West Indies: Dominica. *Kew Bulletin*, 1891, pp. 115-119.

Morris, D. Colony of the Leeward Islands, Dominica. *Proceedings* Royal Colonial Institute, Vol. xxii. (1890-91), pp. 227-241.

Barber, C. A. Bulletin, Agricultural Department. [Supplement to the *Leeward Islands Gazette.*]

I. Cacao in Dominica. 1892.
VII. Cane-killer in Dominica. 1892.
IX. Botanic Station, Dominica. 1892.
XIV. Failure of Cacao crop in Dominica. 1892-93.
XV. Botanic Station, Dominica. 1892.
XXXI. Botanic Station, Dominica. 1893.

Barber, C. A. *Agricultural Journal of the Leeward Islands*, 1894.

Durian Fruiting in Dominica, pp. 32-34.
Gambier Plants in Dominica, pp. 44-45.
Cacao Plants in Dominica, pp. 68-69.

Nicholls, H. A. A. List of Orchids flowered in Dominica in 1894. *Agricultural Journal of the Leeward Islands.* 1894. Part iii., p. 67.

Hamilton, R. G. C. Report of the Royal Commission (1893) appointed to Inquire into the Condition and Affairs of Dominica. London, 1894.

Naftel, C. O. Report on the Forest Lands and Estates of Dominica and on the Agricultural capabilities of the Island. 1897]

300. In Dominica, as elsewhere, the burden of all suggestions to improve minor industries is to instruct and encourage the small cultivators to make the best use of the land, and to grow successfully such plants as will enable them to produce articles for export—in fact, to do something more than grow ground provisions, which it is admitted at present only supply themselves and their families with the bare means of existence. In the late Sir Robert Hamilton's report on Dominica, he dwelt very strongly on the need of teaching the small settlers on these lines. He recommended: "They should be instructed as to the soil, "situation, and exposure best suited for the cultivation of cacao, "limes, and coffee respectively, and of other remunerative pro- "ducts, such as nutmegs, ginger, Sisal hemp, &c. They should "be made acquainted with the best methods of preparing the "ground for the reception of those plants for which it is most "suitable; with the distances that trees of each sort should be "planted apart, which differs even with the same description of "cultivation on steep and on flat surfaces; with the best ways "of sheltering such of them as require shelter; with the best "ways of pruning the trees; and of gathering and preparing "the produce for market."

301. Dr. Nicholls suggests that agricultural instructors and gardeners should be trained at the Botanic Station. "It would," he says, "be to the manifest advantage of the agricultural interest

"of the island were such a system of training established. If "agriculture were taught in the schools throughout the island, "modest agricultural scholarships might be awarded to advanced "students who showed an aptitude in and a taste for the study. "The scholarships should be sufficient to enable students to keep "themselves for a year, whilst they underwent a course of practical "and theoretical training under the curator. In this way a great "deal would be done to advance the welfare of the island, which "is dependent for its prosperity entirely on agriculture."

Layou Flats.

302. One part of Dominica is particularly well suited for being successfully opened for new industries. This is an extensive district almost in the centre of the Island, known as the Layou and Sara Flats. I visited this district in 1890 and again this year. The country is broken up into ravines and low mountain slopes, but is evidently well adapted for purposes of cultivation. A full account of the district was prepared some years ago by Dr. Nicholls for the Government of Dominica, and I cannot do better than refer to that document. I satisfied myself that the country for many square miles was covered with luxuriant forest growth, that it was well watered, and that the soil was capable of growing almost every kind of tropical produce. Dr. Nicholls enumerates twelve valuable timber trees found abundantly in the forest, and adds (see *Kew Bulletin*, 1891, pp. 116—117): "The forests of "these interior flats contain trees of great value for building "purposes, some of them furnishing hard woods and cabinet "woods of considerable strength and beauty; and it is a fact of "importance that the trees producing these valuable woods occur "in abundance, indeed, it has been pointed out by competent "authority that the hard wood trees of Dominica preponderate "greatly 'over the fast growing and soft wooded kinds.'"

303. It is to be remembered that in these districts the lands are not exhausted lands. They are virgin soils that have hardly been touched. On these grounds it is difficult to realise that so fertile and promising an island as Dominica has been so long neglected both by the mother county and by those seeking employment and a suitable investment for capital in tropical industries. This can only be attributed to attention being directed in other directions and to the want of roads and the impossibility of reaching the interior, where lie unutilised the richest lands in the West Indies. The climate is healthy, the seasons are regular, rain abundant, and there is a sufficient labouring population available for all immediate purposes.

X.—MONTSERRAT.

304. Montserrat is situated 27 miles south from Antigua and 40 miles miles north of Guadeloupe. It has an area of 39 square miles. The surface is rugged, and composed of a series of rocky hills and ridges, culminating in several high peaks from 2,500 feet to 3,000 feet high. The island is evidenly of volcanic origin, and a *soufrière* exists in the high lands to the south. There are easy slopes on the western and south-eastern sides, and these are chiefly in cultivation. Other portions of the island are somewhat steep, and broken up into numerous valleys and ravines. The higher parts of the island are clothed to their summits by dense forest with cabbage-palms, tree-ferns, wild bananas, and some valuable timber trees. Although the surface is, on the whole, so rugged and broken, it is estimated that the greater part could be advantageously placed under cultivation.

305. The soil varies from a light sandy loam to a stiff clay, and is generally of considerable depth. The mean annual temperature is 78°. The annual rainfall is about 56 inches in the lowlands and 78 to 80 inches in the hilly parts of the interior. The heat is seldom oppressive, as it is tempered by the sea-breeze. The climate is one of the healthiest in the West Indies.

306. The roads in the island have hitherto been maintained in good order. Some were even picturesque and well shaded with trees. These roads were, however, so seriously injured by heavy floods at the close of 1896, that it will be some time before they are restored to their former condition.

307. The island contains 25,000 acres. There are no Crown lands. The estimated area in forest is 5,000 acres, or one-fifth of the whole. About 15,000 acres, or three-fifths of the whole island, are suitable for cultivation, while the area actually under crops is 10,000 acres, or 66 per cent. of the cultivable area. The principal industries in order of importance are sugar, limes, coffee, cacao, arrowroot, papain (from the papaw fruit) and bay oil. The other crops commonly grown in the island are sweet potatos, yams, eddoes, beans, pigeon-peas, cassava, arrowroot, *tous-les-mois*, aloes, ginger, and Indian corn. The fruit trees furnish tamarinds, oranges, bread-fruit, bread-nuts, and papaws. Many drugs, gums, and resins are found in the mountain woods, and pimento is said to be plentiful, but is not collected for export.

308. The population in 1891 was 11,762, or 1679 more than in 1881, chiefly belonging to the Church of England. There are no East Indian immigrants. The inhabitants (362 to the square mile) are peaceful and quiet. Montserrat is an island of small cultivators who hold freehold allotments of 1 to 3 acres each. They number about 1,200, and live in thriving villages. The cottages are well kept, and surrounded by small gardens with fruit trees and vegetables. Education and an efficient medical service have

tended to improve the circumstances of the black people, and render them as intelligent and, until recently, as thriving as any in the West Indies.

309. Wages at present are 8*d.* to 10*d.* per day for men, and 5*d.* to 6*d.* for women. Most agricultural work on estates is, however, done by task.

Sugar Industry.

310. The area under cultivation in sugar cannot be exactly stated, but may be approximately estimated at 6,000 acres, equal to 40 per cent. of the cultivable area, and 66 per cent. of all lands under crops. The capital invested in the sugar industry is estimated at 60,000*l.*, and in other industries, 40,000*l.*

311. There are 26 sugar estates in the island, with a large number of small holdings also planted in cane. Five important estates are owned by absentee proprietors, and, owing to litigation the cultivation on these is at present suspended. Twelve estates employ steam power, ten wind power, and two water power. All the estates produce raw or muscovado sugar, while rum is distilled on one estate only.

312. It is stated that the sugar industry is carried on, partly by proprietors working their own estates, partly by the metayer system, and partly by small holders. Particulars respecting the extraction of juice, and the return in marketable sugar per ton of canes, are not available. It may be assumed that in these respects the sugar industry in Montserrat is in the same condition as in St. Vincent, Antigua, and St. Kitts-Nevis, and that there is a considerable loss of available sugar, amounting possibly to about 30 to 50 per cent. The industry is admitted to be "in imminent "danger of extinction, as prices at present are below the cost of "production."

313. The value of the collective exports of sugar and molasses (there is no rum exported), with the per-centage during the last five years, are as follows :—

Years.	1892.	1893.	1894.	1895.	1896.
Value of collective exports, sugar, and molasses.	£ 22,745	£ 20,172	£ 17,128	£ 5,286	£ 14,967
Per-centage	75	63	80	31	61
Total exports	30,469	32,204	21,371	16,220	24,213

314. No attempts have been made to produce vacuum pan or centrifugal sugar. "Any such attempt, to have any chance of "success," it is stated, "must be on a comparatively large scale, "and the formation of the island makes it difficult and expensive

"to provide for the carriage of canes to central factories." . . .
"It is probable, therefore, that the increase in the cost of pro-
"duction would be quite equal to the increase of price which
"might be obtained for the superior article." Sugar, though not regarded as the only resource of the island, largely supports the population, and its total failure "would cause severe and wide-
"spread distress. The loss to the revenue, already reduced,
"would be disastrous, as one-half the land tax is payable by the
"sugar estates."

315. It is admitted, however, that the substitution of other industries for sugar, if the necessary capital were forthcoming, would be "more feasible in Montserrat than in islands such as "Antigua, and St. Kitts-Nevis, and eventually would produce a "condition of prosperity." The Commissioner (the Hon. Edward Baynes), concludes, "If, therefore, nothing can be done for sugar,
"efforts should be made in the direction of enabling the pro-
"prietors to procure capital for developing new industries and
"tiding over the interval before they can be brought to profitable
"account."

Alternative Industries.

316. The intelligent and progressive action adopted by the Montserrat Lime Juice Company has had a very beneficial effect in suggesting other subjects of cultivation in the island. Next to sugar, the most important industry is that of lime juice, which has been in existence for the last 25 years. The area under cultivation in lime trees on the Montserrat Company's estates, is 1,247 acres, containing 250,000 trees, while 153 acres are in limes on sugar estates and on small properties distributed over the island. The following table illustrates the quantities and value of the lime juice exported during the last seven years :—

——	1890.	1891.	1892.	1893.	1894.	1895.	1896.
	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.
Raw lime juice	68,503	119,493	72,590	134.869	8,280	130,245	65.260
Concentrated lime juice ..	15,451	10,145	5,190	6,265	2,100	2,272	6,663
Total value ..	£7,063	£9,419	£4,859	£8,843	£729	£6,802	£4,261

317. The average yearly value of both raw and concentrated lime juice exported from Montserrat is therefore about 6,000*l*. To this must be added 453*l*., the value of the essential oil, making the average total value of lime products about 6,500*l*. per annum. As a rule the lime trees grow fairly well in Montserrat, but in some localities they suffer from blight, which requires special treatment.

318. *Coffee* has been cultivated for a long period in some parts of the island, and some old trees still remain. The cultivation has recently been re-introduced by the Montserrat Company, and by Mr. W. H. Wilkin, a local proprietor, and about 100 to 120 acres are now in course of being established. Mr. Barber, late

Superintendent of the Agricultural Department in the Leeward Islands, wrote as follows respecting the coffee growing in Montserrat :—

319. "In Montserrat, under Mr. Hamilton's skilled manage-
"ment, the Montserrat Company have opened up large plantations,
"which are doing exceedingly well, and have commenced to
"bear good crops. I may here point out what a debt the Colony
"owes to Mr. Hamilton, a former Ceylon planter, for having
"introduced into our midst a practical demonstration of the
"way in which a Ceylon plantation was worked before the
"*Hemileia* appeared to destroy the trees. A walk through these
"plantations by intending planters of Arabian coffee will be
"worth volumes of literature and save no end of trouble."
The extent of land suitable for Arabian coffee is, however, very limited, probably not more than 600 acres, in lots of 20 to 50 acres each, but there are large areas in some districts where Liberian coffee might be successfully grown. Experiments are being started in this direction by the Montserrat Company. The quality of the coffee, prepared by Mr. Hamilton, is mentioned as exceptionally good.

320. *Cacao* has been recently tried on small areas, but except in a few sheltered valleys, it is not likely to become an appreciable industry. The price obtained for small lots, cured and shipped by the Montserrat Company, was equal to the best West Indian cacao.

321. *Arrowroot* of good quality is also being produced in Montserrat. Its preparation is favoured by an excellent supply of pure water. Montserrat arrowroot is regarded as nearly as good as the best sorts from Bermuda, and probably surpasses any other quality produced in this part of the world.

322. *Vanilla.*—In the neighbouring island of Guadeloupe vanilla cultivation is a thriving industry. The true vanilla plant is already established under cultivation in Montserrat, and it might be extended under suitable conditions.

323. *Tobacco.*—The opinion is expressed that the cultivation of tobacco might be introduced. In former days tobacco was successfully grown in the island ; at present it would be necessary to obtain expert assistance to start the cultivation and cure the produce on satisfactory lines.

324. *Ginger* grows well, but has never been cultivated on a large scale. In connection with a preserving establishment recently started by the Montserrat Company, it is probable that ginger will receive more attention, especially by small cultivators.

325. *Nutmegs* are said to do well, and kola nuts are also promising. Ground nuts and other oil seeds are suggested as subsidiary industries in favourable localities. Papain, a preparation from the juice of the papaw fruit, is being exported in increasing quantities. This is a small industry not capable of much development ; otherwise the limited market for it would be destroyed.

326. The following table shows the value of exports other than sugar and lime juice :—

Year.	Arrowroot.	Cacao.	Coffee.	Bay Oil.	Papaine.	Total.
	£	£	£	£	£	£
1892	333	8	2	—	40	383
1893	906	76	31	—	133	1,146
1894	663	125	379	—	149	1,316
1895	391	98	112	162	393	1,156
1896	669	62	789	461	501	2,482

Fruit Trade.

327. The small cultivators in Montserrat are an industrious and thrifty people, and they could grow both fruit and vegetables on a moderately large scale for export purposes. The conditions are favourable for starting a fruit trade similar to that already recommended for St. Vincent and Dominica. This would afford immediate assistance in starting other cultivations, and the condition of the people would be greatly improved. The only reason why fruit and vegetables are not more largely grown is the absence of suitable facilities for shipping the produce.

328. There are no special agencies employed in Montserrat in improving the sugar or any other industry. There is no agricultural society, and agriculture is not taught in schools. On the estimates for 1897 the education vote has been diminished by the closing of the High School, and the withdrawal of the boys under apprenticeship at the technical school at St. Kitts.

329. A Botanic Station, with a gardener in charge, was started at Montserrat in 1890, on a small plot of land to the south-west of the town of Plymouth. The space available was utilised for the cultivation of a selected number of economic plants. Large numbers of these were raised and distributed during the last six years. Amongst them were 8,000 plants of Blue Mountain coffee from Jamaica, 1,800 cacao, 2,000 nutmeg, pine apple suckers, grape vines, 800 suckers of the Jamaica banana, Liberian coffee, kola, &c. The gardener also gave information in regard to the cultivation and treatment of new plants The principal recipients were estate proprietors, and not small cultivators. The latter had evidently not been induced to start new cultivations, as, owing to the absence of shipping facilities, there was no prospect of being able to find a market for the produce. Owing to the straitened circumstances of the island, the botanic station has now been abolished, and the services of the gardener diverted to other duties. The work done at this station, with the limited means at its command, was distinctly promising. It was the only organisation existing for improving and extending the cultivation of industrial plants, and its abolition destroyed the hope of immediately benefiting the agricultural interests of the island.

330. The condition of Montserrat as a whole is far from satisfactory. The resources of the local Government are exhausted, and a floating debt hampers all its efforts at improvement. The sugar industry is in imminent danger of extinction, while the small settlers, with good land and a strong desire to utilise it, are unable to dispose of their produce. There is ample opportunity for the prosecution of subsidiary industries, but, as in the case of St. Vincent and Dominica, it is necessary for their development to adopt an entirely new policy, and to carry it on consistently for a number of years, to produce permanent results.

[The following Papers and Memoirs afford information respecting the island of Montserrat :—

Hollings, J. S. Description of Montserrat (with list of Exhibits), Hand-book of West Indies. Indian and Colonial Exhibition (pp. 134–139). London, 1886.

Kew Bulletin, 1888, pp. 214–215. The Fruit Industry of Montserrat.

Morris, D. Botanical Enterprise in the West Indies: Montserrat. *Kew Bulletin*, 1891, pp. 119–124.

Morris, D. Colony of the Leeward Islands : Montserrat. Proceeding, Royal Colonial Institute. Vol. xxii. (1890–91), pp. 241–242.

Barber, C. A. *Supplement to Leeward Islands Gazette* :— X. Botanic Station, Montserrat, 1892. XX. Rainfall Returns for 1892.]

XI.—ANTIGUA.

331. Antigua is the seat of the Federal Government of the Leeward Islands. It contains 108 square miles, less than one-half the size of Middlesex. The surface is comparatively flat, with moderate hills in the south and west, reaching a height of 1,200 to 2,000 feet. The high lands are generally arid and uncultivated, while the low lands with a moderately productive soil, are capable of yielding good crops.

332. As regards configuration and soil, Antigua possesses three well-marked divisions. These do not pass imperceptibly into one another, but are divided by clearly defined natural boundaries. The district to the north and east is either undulating or flat, and is composed of calcareous marls and coarse sandstones, interspersed with masses of tolerably compact limestone. The hilly district to the west and south is composed of trap rocks, with trap breccias and some basaltic greenstones. The intermediate or central district, occupying a depressed area running diagonally across the island from St. John's Harbour to Willoughby Bay, is composed of various clayey formations ranging from loose friable marls of a yellow colour to a whitish indurated clay. In this district there are marine and fresh-water flint beds, with numerous fossils of corals and shells and interesting specimens of silicified woods.

333. The soils of Antigua are nowhere very deep, except in certain broad valleys. In composition they are very varied, but may be described generally as consisting of clays and calcareous marls. The stiffest clays are found in the west, the marls and light clays being found towards the centre and eastern portions. With few exceptions the Antigua soils may be described as fertile and productive. They are fortunately very retentive of moisture, and respond readily to tillage and manures.

334. The rainfall is small and uncertain. The average on a number of years is given as 45 inches. The climate is dry, and occasionally there are seasons of severe drought. There are few or no streams, and the only water available is that accumulated in ponds and pools. Latterly reservoirs have been constructed to supply drinking water to St. John's and some of the country districts.

335. St. John's, the capital, is an extensive and attractive city, with a fine cathedral and other public buildings overlooking the harbour. The population is about 10,000. The other towns are Falmouth and Parham. The latter is on the north-east coast. The population of Antigua in 1891 was 36,119, or 1,155 more than in 1881. Portuguese immigrants were at one time introduced, and latterly 385 Chinese. The latter have nearly all disappeared. Many of the Portuguese and their descendants remain, and some are owners of sugar estates, while others are leading shopkeepers. The white people numbered 1,850, or about 5 per cent. The proportion of the population engaged in the sugar industry is stated to be 34 per cent. "Labour is plentiful and fairly efficient." The wages have been reduced generally since 1894; men now

obtain 8*d.* to 10*d.* per day, women 5*d.* to 6*d.*, and children under 16, 3*d.* to 4*d.* per day. "Owing to the cheapness of food and "clothing the cost of living is small."

Sugar Industry.

336. Sugar and molasses are practically the only products of the soil exported from Antigua. The sugar estates number 78, but some are grouped together and worked as one. One estate only has more than 500 acres under canes, 32 have between 200 and 500 acres, 28 between 100 and 200 acres, and 13 between 50 and 100 acres. The area in canes on all the estates above mentioned is 15,058 acres, while 545 acres are cultivated in small plots of less than 50 acres each. The total area in canes in the island is, therefore, 15,603 acres; of this 8,335 acres, or more than one-half, are owned by absentee proprietors.

337. The average annual exports of sugar during the last 15 years are as follows:—

Periods.	1882–87.	1887–91.	1892–97.
Average annual production of sugar ...	Tons. 12,225	Tons. 14,320	Tons. 12,521

It is estimated that 500,000*l.* are invested in the estates now existing.

338. The cultivation of the land has always been carefully attended to, and latterly, under the advice of Mr. Watts, the analytical chemist, increased attention has been devoted to the composition of the soil and the use of artificial manures.

339. The sugar produced is almost entirely raw or muscovado sugar. There is only one vacuum pan plant in the island. It is admitted the processes of crushing and manufacturing are "very "imperfect."

340. It is stated in the memorandum of evidence submitted by the Agricultural and Commercial Society that the loss entailed by defective crushing, by imperfect manufacture, loss by drainage, and other drawbacks incidental to the production of muscovado sugar, amounts to about 50 per cent., nearly all of which might be saved by improved machinery and skilled supervision.

341. Based on the years 1893–94, the weight of cane required to produce 1 ton of sugar (weighed and sold in New York) was 13·37 tons, but including 1895, when diseased and drought-stricken canes were reaped, it required 13·84 tons of canes to produce 1 ton of sugar. "Taking 13·37 tons as the basis for "Antigua, and 10 tons as an average for other countries, this "shows a loss of 33·7 per cent. on the weight of sugar only. To "this must be added the increased value of vacuum pan products "over muscovado products." The Governor remarks: "No com-"modity at the present day can afford to sacrifice half the value "which proper appliances may obtain from it." Mr. Watts

estimates the total loss to the island by the continuance of the present muscovado process at "a moderate computation" to be 50,000*l.* to 60,000*l.* a year. It is evident from these figures that although Antigua produces richer canes than almost any other part of the West Indies, it cannot possibly compete with its muscovado process with the improved processes adopted by other sugar-producing countries.

342. "The reason," as given in evidence, "why large factories "were not erected in prosperous times was because the profits "derived from muscovado sugar were so good that the proprietors "were content, and had no motive for adopting improved "machinery. Until a few years ago the profit on muscovado "was still good. Further, it was only recently that comparisons "were instituted on reliable data to show the loss that was being "sustained by the ordinary muscovado processes."

343. Very little rum is now produced in Antigua. The amount distilled in 1896 was 16,969 proof gallons. Rum is imported from St. Kitts, where there is a more plentiful supply of water for manufacturing purposes.

344. Molasses under the muscovado system are yielded at the rate of 60 to 70 gallons per ton of sugar. At present molasses are practically unsaleable. This is regarded as another serious blow to the muscovado industry.

345. As showing the almost entire dependence of Antigua on the sugar industry, as also the shrinkage in value, the following table is appended, giving the collective value of sugar and molasses as compared with the total exports of the produce of the island for the last five years :—

Years.	1892.	1893.	1894.	1895.	1896.
Collective value of sugar and molasses	£ 234,720	£ 184,824	£ 156,403	£ 64,349	£ 118,634
Percentage	96	92	92	74	91
Total exports produce of the Colony	244,743	199,870	170,223	87,125	130,361

346. If the sugar industry is to be maintained in Antigua, it is inevitable that the manufacture of muscovado sugar must be abandoned. Mr. Watts states that, with the exception of improvements in the mills for crushing the canes, "the methods and "appliances in use for muscovado sugar have undergone little "change during the last 200 years." Further, such "methods are "unsatisfactory and wasteful in the extreme." On the other hand, Mr. Watts is of opinion that "by the introduction of good "machinery and proper manufacturing processes sugar could "probably be produced at cheaper rates than in any other part of "the world." In fact that "it would be remunerative in Antigua "when prices had fallen below the cost of production in all other "countries."

347. In order to obtain substantial advantages from the improved system, it is necessary to have a factory producing at least 5,000 tons of sugar, in other words, producing one-third to one-fourth of the whole output of Antigua at the present time. Several estates would have to combine to supply such a factory with canes, and necessarily they would have to discard all their existing machinery.

348. It is stated in evidence that "there are excellent sites "eminently suited for the erection of central factories," the country rendering the transport of cane a comparatively easy matter. While groups of estates in the hands of individual owners exist, groups which are well adapted to the centralisation which the altered conditions would demand, there are also many places where the erection of improved manufacturing plant would create a useful class of small holders or cane farmers. It is repeated that "with good machinery it should be possible to "produce sugar in Antigua as cheaply as in any part of the "world."

349. It is due to Mr. Watts, the Government analytical chemist, to state that his services to the sugar industry of Antigua have been most valuable, and are highly appreciated. He has laboured most strenuously for many years to improve the cultivation, and to point out the losses sustained by imperfect crushing, and the manufacture of muscovado sugar instead of high-class sugars. If his suggestions had been carried out some years ago, the sugar industry in this island would undoubtedly have been in a much better position than it is to-day.

Pine-Apple Cultivation.

350. The cultivation of the pine-apple for a very long period has formed an interesting and practically the only minor industry in Antigua. The headquarters of the cultivation is in the neighbourhood of Liberta village, about the centre of the island. The pines grow very freely on hill slopes in a black friable loam. The cultivators are nearly all peasants. The prevailing mode of planting is rough and irregular, with about 3,000 plants to the acre. It is estimated that new land would yield an average of one fruit per plant the first year, worth on the spot 1*d.* each, two the second year worth 2*d.* each, with possibly some the third year of a similar value. If 2,000 fruits are produced per acre at 1*d.* each, this would amount to at least 8*l.* for the first year, while the next year it would amount to more than 32*l.* Antigua pines have been shipped to this country for many years. They are usually packed in barrels containing three dozen and upwards. When care is taken in selecting and packing the fruit, it usually fetches good prices during the months of April and May, but later in the season it becomes unsaleable. The industry is capable of considerable development, but the uncertainty of the shipping facilities by the Royal Mail steamers, and the losses that have been incurred owing to the refusal of cargo at St. John's, have greatly discouraged it. According to Mr. Ackermann, the freight charged is 5*s.* 3*d.* per barrel. The fruit usually fetches 1*l.* per barrel in London. The cultivators pay rent at the rate of 29*s.*

to 28s. per acre for land for pine growing. They usually receive 2s. per dozen for the early fruit, and about 8*d.* to 1s. for the late fruit. Messrs. Halliday and Uphill, who started a Fruit Growers' Association, consider that pine growing could become a profitable industry if the mail steamers offered suitable facilities for shipping. Mr. Halliday stated that "one acre of pines would "give a return of 11*l.*, and that the return on two acres would be "sufficient to maintain a labourer on that alone." The chief difficulties are want of knowledge on the part of the cultivators and of suitable communication with the port of shipment.

351. The fact that this industry has struggled on in spite of all difficulties for so many years is a proof that the natural conditions are evidently very favourable to it. If a canning establishment similar to the one just started at Montserrat were erected in the pine-growing district, it is possible that sufficient fruit could be grown to keep it regularly employed. This would be a means of utilising all the small pines and those produced after the shipping season is over.

352. The value of the fruit and vegetables exported from Antigua during the year 1896 was 2,502*l.*

353. Liberian coffee was successfully grown at an experimental plot established by the Superintendent of Agriculture at Body Ponds. The plants were described as vigorous and fruiting freely. Oranges thrive well in some localities. Dates have been introduced and fruited. Kola, grapes, and figs have also been introduced.

354. On the whole, the circumstances in Antigua cannot be regarded as favourable for subsidiary industries. It might produce more fruit and vegetables for its own use, and thus be less dependent on importations from other countries. Under this head it may be noted that 8,065 barrels of corn meal, of the value of 3,573*l.* were imported and consumed in 1896 in an island where maize can be grown as cheaply as in any part of the world; of corn and grain there were imported 37,157 bushels of the value of 3,296*l.*; of pickled beef, pork, and other meats, there were imported and consumed 637,101 pounds, of the value of 6,437*l.*: while of oil-meal and oil-cake for manures there were imported 633,394 pounds, of the value of 1,423*l.* The total value of these commodities, all of which might have been advantageously produced by persons not engaged in the sugar industry, was 14,729*l.* Attention might also be directed to improving the pastures of the island by extending the cultivation of the admirable "sour grass" in all suitable localities, and to developing the cattle industry, which has suffered of late years from disease and drought.

Botanic Station.

[A Botanic Station was started at Antigua in 1889. The first Curator was Mr. A. G. Tillson, who had been trained at Kew. Mr. Tillson remained in charge until July of this year, when he resigned, after nearly eight years' service. The site selected was a portion of an old sugar estate known as Clare Hall, about a mile to the east of St. John's, the capital. This was practically the only spot

where there was a supply of water, and even here only in moderate quantity. The soil was heavy, but good and deep; the locality was, however, exposed and suffered from the trade winds for many months in the year. It was intended to alleviate the latter defect by planting a shelter belt of mango and other hardy trees to the north-east. The station at Clare Hall was at a later period supplemented by two sub-stations, one at Body Ponds and another at Copse Cross, near English Harbour.

In 1891 it was decided, on the recommendation of the Governor, to appoint a scientific man as Superintendent of Agriculture, to reside at Antigua and take administrative charge of all the Botanic Stations in the Leeward Islands, and also act as secretary of the Agricultural Society. The Superintendent was to devote special attention to the Botanic Station in Antigua, and advise, in conjunction with the Government Analytical Chemist, in regard to the sugar-cane experiments carried on at the Boys' Reformatory at Skerrits: to visit at frequent intervals the stations at Dominica, Montserrat and St. Kitts-Nevis, and supervise all operations carried on at these institutions; to issue Bulletins on the treatment of economic plants suited to the circumstances of the Leeward Islands, and correspond on behalf of the Colony with kindred institutions abroad for the exchange of seeds and plants. Mr. C. A. Barber, F.L.S., late scholar of Christ's College, Cambridge, and University Demonstrator in Botany, was appointed the first Superintendent, and left for the West Indies in September, 1891. It was arranged he should first of all spend a short time in visiting the Botanic Gardens at Jamaica, and then proceed direct to Antigua.

In the Report on the Botanic Station at Antigua for the year 1891, Mr. Barber gave an account of the work done up to that time. The area under cultivation at Clare Hall consisted of five plots with an area of $4\frac{1}{2}$ acres. These were planted with fibre plants, fruit trees, grapes, etc. The work of propagating plants was greatly hindered by "the dry searching winds that withered up the more delicate plants," followed shortly after "by heavy rains that frequently washed away or killed outright batches of valuable seedlings." In spite of these unsuitable conditions large quantities of plants yielding Mauritius hemp (*Furcræa gigantea*), the snake grass (*Sansevieria lanuginosa*), Sisal hemp (*Agave sisalana*) were grown and planted out, also grapes, figs, mangoes, bananas and oranges. The grafting of the best sorts of mangoes was distinctly successful; 25 named sorts were under cultivation. Several varieties of grapes were grown and fruited, some were pronounced "the finest in the West Indies." Experiments were tried in sericulture with promising results. Five thousand plants of the common date were raised from seed supplied from Kew. The first of these fruited in August, 1895, when only $4\frac{1}{2}$ years old (*Kew Bulletin*, 1896, pp. 26–28). Particular attention was given to fodder plants of various kinds, including Seradilla (*Ornithopus sativus*), Locust beans (*Ceratonia Siliqua*), Lucern, Lupins, Prickly Comfrey, and Teosinte (*Reana luxurians*).

At Body Ponds, in the hilly district in the south-west, four patches of Crown land were cleared, amounting to about two

acres. The plants cultivated were coffee, cacao, dates, Central American rubber, and vanilla. The object was to show what plants were suited for the sheltered valleys of Antigua. As remarked by the Superintendent, "anything that succeeds at Body Ponds should also succeed in the Christian Valley and Fig-tree Hill regions, and in multitudes of little gullies where small springs exist."

At Copse Cross, near English Harbour, in the south-east of the island, Sisal hemp succeeded remarkably well. *Sansevieria lanuginosa* was found in this locality in a semi-wild condition, and the cultivation of this valuable fibre plant was capable of being extended over a large area. Cotton was also successfully grown, and samples sent to England were favourably reported upon. Pine-apples did exceedingly well; in fact, this district is the head-quarters of the pine-apple cultivation. A local variety is known as the Black or Antigua Pine.

In 1893 it was suggested to move the Botanic Station from Clare Hall to a portion of cleared land close to the town of St. John's, known as Victoria Park. The Superintendent pointed out that such a removal would take away the possibility of carrying on the experiments already instituted with vegetables, fruit trees, and fodder plants; in fact, such experiments would have to be abandoned altogether. It was, however, decided that the change should take place, and under pressure of circumstances it was attempted to maintain one chief and three sub-stations in the island at a total cost of 250*l*. a year! The sub-stations were soon after practically abandoned. In spite of this the Superintendent was able to report in 1894, "the station has steadily gained ground ever since the removal of the principal part of it to the Victoria Park. Although a good deal of the Curator's time has naturally been taken up in the preparation of the waste lands of the Park, yet economic work has not been neglected, but there is a greater amount of useful economic work done at the present moment than ever before."

At this time the Department of Agriculture included the head office in Antigua, four Botanic Stations at Antigua, Dominica, Montserrat, and St. Kitts-Nevis, with an experimental sugar station at St. Kitts. The control of these was vested in the Superintendent, by whom they were regularly visited. The Bulletins issued by the Superintendent were 36 in number, of which between 7,000 and 8,000 copies were distributed all over the Colony and to correspondents in different countries in usual course of exchange. The Bulletins contained information of practical importance in the domains of botany, vegetable pathology, agriculture, geology, entomology, veterinary science, and allied branches of study. An "Agricultural Journal" was afterwards started, of which three numbers were issued. In addition, reports on special subjects were prepared for the Government, containing technical advice on various measures proposed for the improvement of the agriculture of the islands. An investigation of the diseases affecting cattle in Antigua was undertaken, as also of the various fungoid and insect diseases which had so seriously injured the sugar-canes both at Antigua and St. Kitts-Nevis.

"Numerous other pests of the islands were determined, principally with the assistance of the United States Entomological Department, and the Royal Gardens, Kew."

The Superintendent had necessarily a large amount of travelling to do. "There have been," he said, "thirty-two visits paid to the islands other than Antigua," involving an absence from headquarters of 322 days during less than three years.

The Superintendent closed an interesting review of the work accomplished to the end of 1894 as follows :—

"The Department has accumulated a valuable library, herbarium, and the commencement of a named museum.

"In the *Library* there are between 2,000 and 3,000 books, pamphlets and journals on agricultural subjects. This basis of a scientific agricultural library has been collected entirely by the correspondence and personal influence of the Superintendent of Agriculture. Many valuable additions have been received through the generosity of the Royal Gardens, Kew, and especially the various branches of the United States Department of Agriculture.

"There are over 50 current periodicals regularly received. Annual reports are received from most of the Botanical and Agricultural Departments of the tropics.

"In the *Museum* there are various samples, principally connected with plant diseases, in about 200 bottles. Many of them have been determined by eminent men, who at the same time have given hints as to their proper treatment.

"It is proposed to add a representative series of the principal economic products—a few have been collected, and they could be indefinitely increased by correspondence.

"In the *Herbarium* there are several valuable collections of West Indian plants received through the kindness of the Director of the Royal Gardens at Kew. The clerical work of the office has at present prevented the putting in order of these specimens. The grasses, connected as they are with pasturage, have alone been mounted. With a little temporary assistance a valuable herbarium could be placed at the service of the Department."

As exemplifying the singular want of continuity which unfortunately too often is a characteristic of efforts for the improvement of the West India Islands, the whole of the important and active work carried on by the Agricultural Department of the Leeward Islands was suddenly cut short by the refusal of some of the members of the Legislative Council at the session held in December, 1894, to pass the vote for the Superintendent's salary. The reason given was that the Colony, owing to the depressed condition of the sugar industry, was unable to afford the services of a scientific man. Mr. Barber left in March following, and the Department was abolished. The Botanic Station at Antigua was continued, but in a helpless and crippled condition. Mr. Tillson, the Curator, worked under discouraging circumstances for some time, but ultimately resigned in 1897. He had discharged his duties throughout in a careful and conscientious manner.

It only remains to add that in an agricultural community

requiring special scientific aid in these days of competition and of diseases affecting staple industries, the action taken by the Legislative Council was most unfortunate and inopportune. The result is that at the present moment all efforts at improvement in the agricultural interests of the Colony are practically in abeyance.

The following Papers and Memoirs afford further recent information respecting the sugar and other industries in Antigua :—

Harris, C. A. Description of Antigua (with list of Exhibits). Handbook of West Indies. Indian and Colonial Exhibition (pp. 97–106). London, 1886.

Hooper, E. D. M. Report upon Antigua in relation to Forestry. Colonial Office, 1888.

Morris, D. Botanical Enterprise in the West Indies: Antigua. *Kew Bulletin*, 1891, pp. 111–115.

Morris, D. Colony of the Leeward Islands: Antigua. *Proceedings* Royal Colonial Institute, Vol. xxii. (1890–91), pp. 243–244.

Barber, C. A. Bulletin Agricultural Department. (Supplement to *Leeward Islands Gazette*, 1891–94.)

IV. Fibre Planting in the Leeward Islands. 1892.
XI. Botanic Station, Antigua, Part i. 1892.
XII. Botanic Station, Antigua, Part ii. 1892.
XVII. Vegetable Seeds, Antigua and Dominica. 1893.
XXI. Report on Furcræa Fibre Plantations in the Leeward Islands. 1893.
XXII. Notes on Antigua Pine-apples. 1893.
XXIII. Supplementary Note on Furcræa Fibre Plantations. 1893.
XXV. The Diseases of Sugar Cane. 1894.
XXVI. Report on moving the Botanic Station, Antigua. 1894.
XXVII. Remedies for Cane Disease. 1894.
XXVIII. Report on Botanic Station, Antigua, for 1893. (A. G. Tillson.)

Barber, C. A. *Agricultural Journal of the Leeward Islands*. 1894.

Coffee Planting in the Leeward Islands, pp. 17–19.
Eucalyptus Globulus in the Tropics, pp. 34–36.
Note on Cane Diseases, pp. 53–37.

Watts, Francis. Supplement to *Leeward Islands Gazette*.

II. Rainfall in Antigua. 1891.
XIII. Meteorological Record for 1892.
XXX. 12 Varieties of Sugar Cane grown in Antigua.

Reports of the Results obtained on the Experimental Fields in St. Kerrits. 1892 and 1896. (F. Watts and F. R. Sheppard.)
The Manufacture of Muscovado Sugar in Antigua in the years 1893, 1894 and 1895. (F. Watts.)]

XII.—ST. KITTS.—NEVIS.

357. The three islands of St. Christopher, Nevis, and Anguilla, lying West of Antigua, form a group of the Leeward Islands, under an administrator residing at St. Christopher or St. Kitts. Anguilla was not visited by the Royal Commission. A note on this dependency is added later.

358. St. Kitts contains 68 square miles. The area of the main body presents the appearance of a long oval, with a narrow neck extending in a south-easterly direction towards Nevis. The land slopes on all sides from a central ridge, which culminates in a massive peak called Mount Misery, with a height of 4,060 feet. The island is of volcanic origin, and possesses a rich and fertile soil, composed of a fine loam, easily worked, with a substratum of gravel or disintegrated volcanic rock. The lower slopes and valleys present a cultivated appearance. The cane fields extend on all sides to the sea, and up to a height of about 1,000 feet. The houses and sugar works, usually surrounded by trees, are dotted over the country, and relieve the monotony of the cane lands. Above the sugar estates are stretches of pasture lands, and visible under the clouds surrounding Mount Misery are summits covered with forest. St. Kitts is, on the whole, one of the pleasantest and healthiest islands in the West Indies. The heat is tempered by refreshing breezes, and rain is fairly abundant. An excellent main road, 30 miles long, is maintained round the island. There is no harbour. The roadstead at Basseterre is chiefly used by shipping.

359. The area of St. Kitts is 42,000 acres; of this 13,000 acres, or 30 per cent., are returned as useless land. All except 150 acres of Crown lands are in private hands. There are 1,062 acres of cultivable land above 1,000 feet, and 7,967 acres above 500 feet elevation. Covered with forest are 9,558 acres, or 23 per cent., while beneficially occupied under cultivation are 18,385 acres, or 44 per cent. It is stated that all the land that could be used for cultivation "with any prospect of paying" is already utilised for this purpose.

360. The population in 1891 was 30,876, or 454 to the square mile. The number of persons employed in the sugar industry was 10,718, or more than one-third of the total population of the island. There is according to the evidence of the committee of the Agricultural Society, "an ample supply of native labour; "no difficulty is experienced in obtaining as much as is re- "quired." The rate of wages is from 10*d.* to 1*s.* per day for men, and 5*d.* to 6*d.* for women, for ordinary estate work; by task work, when available, a man may earn from 1*s.* to 3*s.* per day. While the rate of wages has not been generally reduced, employment is now less regular than formerly, owing to economies necessitated by the low price of sugar. There are comparatively few peasant proprietors in St. Kitts, in fact the labouring class owns "no land except in towns or villages for "house-spots." Land is, however, let on estates for provision

grounds to labourers working on the estates. Portuguese are said to make the only satisfactory tenants on small holdings. One unfavourable feature regarding the population of St. Kitts, according to the evidence, is that about one-third of it is congested into a small area within the town of Basseterre.

361. NEVIS is almost circular in form, with an area of 50 square miles. It is separated from St. Kitts by a strait of about two miles wide. The cultivated parts of the island are the lower slopes, and the platform on which stands the single volcanic mountain, or Peak of Nevis, 3,200 feet high. The upper portion of this peak is covered with forest. The soil composed of disintegrated volcanic rock, is fertile, but the island is subject to severe drought, and crops of all kinds occasionally suffer. The area of Nevis is 32,000 acres; of this area 8,000 acres, or 25 per cent., are returned as rocky or useless land. Only 50 acres are in the hands of the Crown. The area of cultivable land is 23,914 acres, little of which is above 500 feet elevation. Only 11 per cent. of Nevis is now under forest. while the area beneficially cultivated is 6,868 acres, or a little more than one-fifth of the total area.

362. The population at the census of 1891 was 13,087, or 262 to the square mile. The number of persons employed in the sugar industry was 4,964, or more than one-third of the population of the island. A very large number of peasant proprietors exists in Nevis, and the "condition of the labouring people is better than " . . . . in the other islands." Again, "the people are not "massed in towns, but are fairly diffused through the island." Dr. Branch confirms this: "The vital statistics in Nevis," he states, "are in all respects better than those of St. Kitts . . . "the crowding of the people in towns in St. Kitts has much to "do with this. The people in Nevis have more land, and their "lives are passed under more favourable circumstances."

SUGAR INDUSTRY.

363. The circumstances of the sugar industry in St. Kitts and Nevis are so very similar that, unless otherwise mentioned, the facts given below apply to both islands.

364. The area under cultivation in sugar in St. Kitts-Nevis is 22,253 acres, or about 30 per cent. of the cultivable area. There are 35 estates with areas over 500 acres, 50 estates with areas between 200 and 500 acres, and 26 estates with areas between 100 and 200 acres, while there are 25 estates, chiefly in Nevis, with less than 100 acres. Altogether there are 136 estates, with a total area of 22,253 acres; 46 of these estates are owned by non-resident proprietors; and 79 estates employ steam power, and 13 wind power. Nearly all the sugar produced is raw or muscovado sugar; one estate only produces vacuum pan centrifugal sugar equal to about 400 tons per annum. The average cost of producing a ton of muscovado sugar is stated to be 9*l*. 9*s*. $4\frac{3}{4}d$., viz., 9*l*. 11*s*. $4\frac{1}{2}d$., in St. Kitts and 9*l*. 1*s*. $4\frac{3}{4}d$. in Nevis.

365. The collective value of the sugar, rum, and molasses exported from St. Kitts-Nevis during the last seven years is as follows :—

——	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Collective value of sugar, rum, and molasses.	£ 210,005	£ 171,327	£ 204,882	£ 252,643	£ 198,167	£ 125,809	£ 105,245

The value of the exports has therefore fallen just about one half. Owing to the decline in prices "the greatest economy is practised "on estates, and reductions are made in every possible direction " . . . they cannot be further curtailed."

366. The cultivation of the land in St. Kitts has always been very carefully and thoroughly carried out. The soil is easily worked by plough and hoe, and green dressing and other manurial treatment has been intelligently carried out. The application of artificial manures has not been universally adopted, probably owing to the absence of exact knowledge respecting the composition and requirements of the soil. The yield of sugar crops is more than usually dependent on the amount of the rainfall. If there is an average quantity of rain, the land yields large crops; on the other hand, if a short period of drought supervenes, the porous soil soon dries up, and the canes immediately suffer. The position as regards the manufacture of sugar is not so satisfactory. For instance, in a memorandum by Mr. A. O. Thurston, of Nevis, it is stated that "the mean expression of the sugar mills on his "estate is 60 per cent. of juice from the weight of cane, and "the return of sugar is 6·32 per cent. If all the molasses "were re-boiled, a return of about 7·25 per cent. of sugar from the "weight of cane would be obtained." In the former case it will be seen that it would require 16 tons of canes to produce 1 ton of sugar, and in the latter 13·79 tons. With central factories it is admitted that only 10 or 11 tons of similar canes would be required to produce 1 ton of sugar, while the latter would be of better quality, and fetch higher prices.

367. Mr. Todd is of opinion that there are suitable localities for establishing central factories in the Basseterre Valley, the Old Road district, and the north-east part of the island. Tram lines could easily be laid down to bring the canes along the slopes, and from the base of the hills to the factory. In Nevis, one or possibly two central factories could be established. The only markets for muscovado sugar produced in these islands are the United States and Canada. Of the crop of 14,822 tons exported in 1896, there were exported to the United States 11,464 tons, or 77 per cent., to Canada 2,609 tons, the United Kingdom only 688 tons, and other countries 61 tons. For the bye-products, molasses and rum, formerly there was a good sale, and the proceeds "went a long way in paying the labour bills on the "estates." At present, molasses, that a few years ago sold for

25 cents per gallon, are now at a nominal price of 5 cents per gallon, and even at this price they cannot be disposed of. Rum has equally declined in value

368. Mr. Horsford stated, "in 1883 we shipped as nearly as "possible the same crop that we did in 1896, say about 14,800 tons. "The value in 1883, including molasses and rum, was 238,473*l.*, "while last year's crop realised only 105,245*l.*, or considerably "less than one half." As showing the falling-off also in the general trade of the Colony, Mr. Horsford states that the value of the imports and exports together in 1883 amounted to 583,000*l.*, as against 277,000*l.* during last year (1896).

369. There is said to have been no lack of capital in working the majority of estates in St. Kitts, as they were held by English proprietors and merchants, but, according to Mr. Horsford, "the "fact that instructions have been sent out by several of the owners "to stop cultivation after the present crop has been reaped, is a "proof that the resources of credit are at length exhausted."

370. Valuable information respecting the condition of the sugar industry in St. Kitts-Nevis is obtainable from a summary furnished by the Committee of the Agricultural Society from returns of 20 representative estates in these islands. These estates had under cultivation 7,078 acres, or an average of 353 acres each. The average amount spent per acre on the cultivation in 1896 was 2*l.* 6*s.* 7$\frac{1}{4}$*d.*; on artificial and other manures, 12*s.* 1$\frac{3}{4}$*d.* The total amount of raw or muscovado sugar produced on the 20 estates was 5,117 tons, or an average of 251 tons each. The average yield per acre on the area under cultivation (but not necessarily on the area actually reaped) was 0·78 ton. There were also obtained 216,822 gallons of molasses, equal to 44 gallons on every ton of sugar produced. On three estates there were distilled 56,046 gallons of rum. The average cost (including the expenses of cultivation and manufacture, but taking no account of interest on capital and wear and tear of machinery) in producing 1 ton of sugar in 1896 was 9*l.* 9*s.* 4$\frac{3}{4}$*d.* The number of labourers employed in cultivating 7,078 acres was 2,694, equivalent to one labourer for every 2·6 acres. It was not possible to obtain the actual return sales for the sugar and molasses produced on all the estates included in the above return, but in the case of one of the largest of them, the original papers were placed before the Commission. The total weight of muscovado sugar sold in New York was 300 tons net (672,139 pounds). The net total amount received was 2,684*l.* 12*s.* 6*d.*, or an average of 8*l.* 18*s.* 11*d.* per ton. As the average cost of producing a ton of sugar in St. Kitts-Nevis was 9*l.* 9*s.* 4$\frac{3}{4}$*d.*, it would appear that after allowing for the offal realised, there was no chance of making a profit on the year's work. It may be added that the seasons in 1896 were of a favourable character.

371 Cane disease has materially affected the crops in these islands and constant attention has been devoted to the subject. A valuable report on cane diseases in St. Kitts was read before the local Agricultural Society by the late Superintendent of Agriculture in 1894. All the canes affected by the moth borer have been

cut out as soon as detected; canes affected by shot borer and fungus have been burnt. The average loss during 1896 by disease has been estimated at more than 8 per cent. of the canes produced. The principal cane cultivated is the Bourbon, but the Jamaica cane (known also as the Caledonian Queen and the White Transparent cane) has been found to resist disease better than the Bourbon cane, and to be peculiarly suited to the light volcanic soil of St. Kitts. It also withstands drought and sea breezes, and hence has almost entirely superseded the Bourbon cane on some estates. Experiments in cane cultivation were started by the late Superintendent of Agriculture at the La Guerite estate. It is stated that "the planters generally are anxious to obtain new varieties "of cane for trial, and it is necessary to provide means "for supplying them." Twelve new varieties of canes were recently distributed from the Botanic Station to 14 estates in St. Kitts and Nevis. The number of canes included in this distribution was 2,490.

372. The peasant proprietors in Nevis (there are practically none in St. Kitts) generally grow canes on their lands, and the juice is made into sugar at the neighbouring estates. In this way they obtain a lump sum, so that, in fact, "their plot of canes is like a "small savings bank to them." The fall in prices has now seriously affected these people; but so far they have not turned their attention to other industries.

Subsidiary Industries.

373. In St. Kitts-Nevis there is no industry but sugar. These islands are, if possible, more exclusively devoted to sugar than even Antigua and Barbados. The land in St. Kitts could produce coffee, limes, arrowroot, tobacco, fibres, and fruit. Mr. Boon is of opinion that "there is plenty of labour in the island for other industries "than sugar." Nearly all the West Indian fruits grow luxuriantly in the island. A fruit trade, as well as a trade in fresh vegetables, could be established if suitable shipping facilities were provided. It is unnecessary to dwell upon the capabilities of these two fertile islands for subsidiary industries. It is undeniable that they are amongst the most favourably situated of any islands in the West Indies. Until, however, it has been clearly shown that the sugar industry cannot any longer be maintained as hitherto, it is hopeless to urge that attention be given to other industries.

374. As in the neighbouring sugar islands, the importation of food stuffs, most of which could be produced locally, is exceptionally large. During the year 1896 the total imports into St. Kitts-Nevis were of the value of 157,087*l*. Of these the value of the food stuffs, such as maize, corn, and meal, beef, and pork, was 57,222*l*., or fully one-third. Under such circumstances it is lamentable that the small proprietors should still continue to devote attention only to canes, and neglect the cultivation and production of other and more remunerative subjects. It was stated in evidence that ground provisions are not cultivated as they should be: "They are often scarce and dear." The peasants "buy "imported rice and Indian corn, while with a little energy they

"could feed themselves." And, again, "yams and sweet potatos "are imported into St. Kitts from the neighbouring Dutch island "of St. Eustatius."

375. There are unlimited supplies of fish in the waters around the islands, but fishing is regarded as of little or no importance. One witness stated that "owing to this neglect, fish of the better "kind is a scarce commodity." Live turtle is occasionally exported.

Botanic Station.

[An account of the starting of the Botanic Station at St. Kitts is fully given in the *Kew Bulletin*, 1891, pp. 126—129. There was considerable difficulty in finding a suitable site within easy reach of the town of Basseterre, but eventually it was decided to place the garden to the west of the town, on a spot rather dry and near the sea, but otherwise unobjectionable. Since 1891 a well-laid out ornamental garden has been successfully established, and it has become a favourite resort for the congested population of Basseterre. In addition the station has been the means of raising and distributing many economic plants, such as 20,000 Arabian coffee, 5,000 Liberian coffee, and 1,000 cacao plants, while latterly some valuable new varieties of sugar cane have also been distributed. The cost of maintaining this station has been exceptionally small; in fact, less than that of any other station in the West Indies. The first Curator, appointed in 1889, was Mr. Charles Plumb, trained at Kew.

Mr. Plumb planned and laid out the garden and skilfully adapted it to the circumstances of its surroundings. There are high banks with a belt of trees to shelter it from the sea-breeze, and a strong fence of *Furcraea* to keep out trespassers. A plant shed contains an interesting collection of ferns and pot plants requiring special protection, while several plots of economic plants are also under cultivation. Mr. Plumb resigned charge of the station in 1893, and was succeeded by Mr. Joseph Wade, an English gardener, who had long been resident in St. Kitts, and for a short time in charge of the Botanic Station at Montserrat.

In 1894 it was arranged to establish an experimental sugar station on the La Guerite estate, adjoining the Botanic Station. About 60 varieties of canes were placed under cultivation, and 40 manurial plots were prepared by the Superintendent, with the co-operation of the Government Analytical Chemist.

Owing to the removal of the Superintendent by an adverse vote of the Legislative Council in 1894, these experiments were not carried on, and since that time I regret to say nothing has been accomplished of a practical character. Taking into account the complete dependence of St. Kitts-Nevis on the cultivation of the sugar cane, and the great loss sustained by planters of late years by disease and other circumstances affecting their canes, it is almost incredible to find that the efforts to improve the industry by the introduction of new canes or the improved yield by manurial experiments of canes already in the island should have received so little support.

Further information of a recent character respecting St. Kitts-Nevis and Anguilla may be obtained from the following :—

Harris, C. Alexander. Description of St. Kitts-Nevis (with list of Exhibits). Handbook of West Indies. Indian and Colonial Exhibition (pp. 107–113), London, 1886.

Holme, Archdeacon. Fruits of St. Kitts. *Kew Bulletin*, 1888, p. 215.

Morris, D. Botanical Enterprise in the West Indies : St. Kitts-Nevis and Anguilla. *Kew Bulletin*, 1891, pp. 124–132.

Morris, D. The Colony of the Leeward Islands : St. Kitts. *Proceedings* Royal Colonial Institute, vol. xxii. (1890–91). pp. 244–247.

Barber, C. A. Bulletin Agricultural Department. (Supplement to the *Leeward Islands Gazette*, 1891–94.) :—

XVI. Meteorological Record for St. Kitts for 1892. (E. A Hancock).
XIX. Outbreak of Shot Borer in St. Kitts. 1893.
XXIX. Experimental cultivation in St. Kitts, with special reference to cane diseases in the island. 1894.]

377. There is a Government analytical chemist maintained in the islands. An Agricultural Society is in existence, which depends for its revenue on the subscriptions of members. No attempt is made to teach agriculture in the elementary schools. The Inspector of Schools for the Leeward Islands states that it would be possible to give agricultural training in primary schools, but the teachers would first have to be taught. He would recommend that there should be central schools in each island, with plots of land attached, where the teachers could go for instruction. A technical school for teaching mechanical trades has been in existence for a short time in St. Kitts. The institution undertakes work for the sugar estates, and the boys promise to turn out good tradesmen. A Select Committee of the Legislative Council, has, however, recommended "the withdrawal of expenditure on account of elementary education, of the grammar school, and of the technical school." This, they stated, "was absolutely necessary in view of a probable deficit of not less than 15,000*l.* on the estimates for the current year."

378. As a matter of urgent importance, attention is directed to the statement placed before the Royal Commission by Mr. L. M. Kortright, Superintendent of Public Works, respecting the occurrence of destructive floods in St. Kitts, due, he alleges, to the indiscriminate deforesting of the mountain lands. Mr. Kortright suggests that the question of reclothing these lands with trees should be dealt with in a scientific and thorough manner, and that the Government should further undertake, in the public interest, the control of the chief watercourses in the island, and regulate them so as to diminish the considerable injury now done to the cultivated lands.

379. ANGUILLA.—This was formerly included with the Virgin Islands, but now forms a part of the Government of St. Kitts-Nevis. It is a low flat island lying about 60 miles north of St. Kitts, and contains 35 square miles. The higher lands are along the coast; the interior is depressed, and slopes slightly towards the north-east. There are few or no swamps, and the island is extremely healthy. The surface is composed of porous limestone, with highly calcareous marls and stiff clays. Although the island is for the most part rocky and poor, there are several patches suitable for cultivation. The island, however, suffers occasionally from severe drought, and during such seasons the inhabitants, about 3,000 in number, endure great privations. An account of a visit to Anguilla in 1890 was included in my Report to the Secretary of State for the Colonies in 1891 (*Kew Bulletin*, 1891, pp. 129–32). In that year the cultivation of Sisal hemp was started by the Government to afford employment to those in distress. A considerable area was planted with Sisal hemp (*Agave sisalana*) and Mauritius hemp (*Furcraea gigantea*). Since that time the plantations have been allowed to become overgrown with weeds and bushes, and the cost of again clearing the land would be very considerable. Besides many of the plants have flowered, and hence are useless for yielding fibre.

380. When the rains are abundant the people, a healthy and vigorous race, raise crops of sweet potatos, cassava, pigeon-peas, and okros. Ponies, cattle, goats, and poultry are successfully raised, and these, as well as the produce, find a market at the neighbouring islands of St. Martin's and St. Thomas.

381. Mr. Kortright, in a memorandum placed before the Commission, refers to Anguilla as follows:—"Mr. Hancock's "investigation showed a soil of unusual fertility, but rendered of "uncertain productiveness by droughts. There was a possibility "of obtaining water for irrigation purposes from subterranean "sources . . . boring tools have lately been imported, and it "is intended to make trial borings as soon as possible." It is pointed out, however, that if the trial borings indicate a method of irrigation "the cost of putting such a scheme into effect is "beyond the financial powers of St. Kitts-Nevis."

XIII.—JAMAICA.

382. Jamaica is one of the Greater Antilles lying in the Caribbean Sea, 90 miles south of Cuba, and about 1,000 miles westward of Barbados. The Turks and Caicos Islands and the Cayman Islands are dependencies of Jamaica. The area of Jamaica is 4,207 square miles, about one-half the size of Wales. The dependencies have an area of 89 square miles. The island is very mountainous, with a main ridge running east and west, culminating in the famous Blue Mountains, with elevations of 5,000 to 7,350 feet. Numerous subsidiary ridges, some parallel to the main ridge, others spreading out in a north-east and south-east direction, form a surface of considerable complexity.

383. All parts of Jamaica are picturesque and interesting. There are numerous rivers and streams, with, for the most part, a rapid fall. The Black River in the south-west is the only one that is navigable. There is, as might be expected, a great variety of climate, the temperature ranging from the tropical heat of the plains (80° to 86°) to the comparatively cool, and sometimes even cold, climate (45° to 60°) of the highest mountains. The mean temperature of Kingston is 78°, rising to 87° in the daytime, and falling to 70° at night. At 5,000 feet the mean annual temperature is 65°. The mean annual rainfall is 67 inches. In the north-eastern districts it is as high as 85 inches; in others, south and west, it falls as low as 50 inches. For the most part the rainfall is well-distributed throughout the year. The heaviest rains are in October. What are termed the May rains are often partial, and even fail altogether. In consequence, some parts of the island suffer from drought, and irrigation is necessary. As in most of the islands in the Caribbean Sea, hurricanes are occasionally destructive.

384. Jamaica possesses a large extent of land at various altitudes suited for the cultivation of nearly all tropical and sub-tropical plants. The soil is usually very productive, and even where it has been cropped for years its fertility can be restored by careful cultivation and manuring. Jamaica possesses possibly the most varied and valuable collections of economic or industrial plants of any tropical country. These have nearly all been introduced from other countries by the Botanic Gardens, and their distribution throughout every part of the island, begun in 1777, has been continued uninterruptedly to the present day. It is this varied and abundant supply of plants which enables the island to take immediate advantage of any demand that may arise for new products, while the diversified character of its climate and soil and its abundant population afford means for developing almost any industry on a comparatively large scale.

385. Of the total area of 2,692,480 acres, about 80,000 acres, equal to 2·97 per cent., are estimated to be occupied by swamps and rocky, or other useless, lands. Of the estimated area of cultivable land, 2,340,412 acres are in private hands, while in that of the Crown there are approximately 272,068 acres. Nearly one-half of the estimated area of the cultivable land in the island is at

or above 1,000 feet elevation. More than 70,000 acres of Crown lands have been conveyed to the West India Improvement Company, but, so far, remain unutilized; a further area of 76,000 acres is due under an agreement for the construction of 120 miles of railway.

386. The estimated area covered by forest is 330,000 acres equal to 12 per cent. of the whole area. As only a portion of this can with safety be cleared, the estimate of cultivable land above given should be reduced by about 300,000 acres. There are now beneficially occupied in cultivation 693,674 acres, or a little more than one-fourth of the whole cultivable area.

387. Of the uncultivated lands, both private and Crown lands, there are extensive tracts suitable for the cultivation of oranges, coffee, kola, cacao, nutmeg, and other plants of a permanent character. The cost of making roads to these lands is estimated at 250*l*. per mile for bridle paths, and 600*l*. per mile for cart roads. Such lands range in altitude from 1,500 to 6,000 feet. The climate is cool and healthy. It is stated that when served by roads these lands would be within one hour, or at the most two hours, of post offices, shops, church, and medical aid.

388. The present cultural industries in order of importance, as determined by the exports of 1895–96, are as follows:—Sugar (including rum and molasses), 360,059*l*.; logwood, 359,030; bananas, 316,560*l*.; coffee, 284,822*l*.; oranges, 169,794*l*.; pimento, 90,045*l*.; ginger, 50,328*l*.; cocoa-nuts, 37,773*l*.; cacao, 17,528*l*.; tobacco, 7,648*l*.; grape fruit, 5,832*l*.; lime juice, 4,818*l*.; annatto, 3,194*l*.; pine-apples, 524*l*.; kola-nuts, 291*l*.

389. In order of importance, as determined by area, during the same period:—Pimento, 63,193 acres; sugar, 30,036 acres; coffee, 25,559 acres; bananas, 19,227 acres; cocoa-nuts, 10,940 acres; cacao, 1,632 acres; tobacco, 261 acres; ginger, 84 acres. There were numerous small areas with mixed cultivation not included in the above. There were also 95,808 acres returned under ground-provisions; 126,877 acres under guinea-grass, and 342,020 acres under common pasture and pimento.

390. The population of Jamaica, according to the census of 1891, was 639,491; an increase of 56,681 on the population of 1881 and an increase of 138,337 on the population of 1871. The white population in 1891 was 14,692 (a little over 2 per cent.); coloured and black, 610,579; East Indians, 10,116; Chinese, 481. The total estimated population on the 31st March 1896 was 694,865, or 165 to the square mile. The estimated annual death-rate in 1895–96 was 22·7 per 1,000; the birth-rate 39·8 per 1,000. The portion of the population directly employed in the sugar industry in 1891 was 39,046, or 6·1 per cent.; in other agricultural industries, 232,250, or 36·3 per cent. The number of East Indian immigrants in the island in 1896 was as follows:—Indentured, 3,762; time expired, 10,366; total, 14,128. The cost to the employer of each coolie is 17*l*. 10*s*. (payable during the first five years) for bringing him in, and 12*l*. 10*s*. (payable during the following five years) for sending him back. The annual amount,

which falls upon the general revenue for immigration purposes is 7,900*l*. This is for office expenses, inspectors, hospitals, and medical attendance.

Sugar Industry.

391. The area under cultivation in sugar cane is 30,036 acres, equal to 1·14 per cent. of the cultivable area, and equal to 16·4 per cent. of all lands under crops in the Colony, or to 34 per cent. of the lands producing exportable crops. It is approximately estimated by the Sugar Planters' Association that the amount of capital invested in the sugar industry is 1,167,000*l*., and that the annual amount expended in wages amongst the labouring and tradesmen classes is 378,300*l*.

392. The number of sugar estates at present existing in the Colony, with an area exceeding 500 acres, is 137. These have a total area of 266,903 acres, of which 24,785 acres are in canes. There are three estates over 200 but not over 500 acres, with a total area of 1,314 acres, of which 187 acres are in canes. In addition there are 5,064 acres in canes cultivated by small settlers.

393. It would appear, therefore. that there are 140 sugar estates in Jamaica, with a total area of 268,217 acres, of which 24,972 acres are in canes. These, with the 5,064 acres in canes owned by small settlers, bring the total up to 30,036 acres. The export of sugar in 1895–96 was 21,930 tons, and allowing for that locally consumed (one-third of the whole), the average production may be estimated at a little over one ton per acre.

394. Steam power is employed on 95 estates, water power on 38, water and steam on 3, and cattle on 4. Raw or common muscovado sugar is produced on 40 estates, and open-pan centrifugal sugar on 98. Two estates only employ a vacuum pan and triple effet. Rum is an important product in Jamaica, and is distilled on 138 out of 140 estates. In recent years the rum crop has been often more valuable than the sugar crop. There is usually produced a cask of rum (100 gallons) for every ton of sugar. It is estimated by the Sugar Planters' Association that "the average "cost of production of one ton of sugar (muscovado, cured by "centrifugal) and 100 gallons of ordinary rum is 20*l*."

395. In one district Mr. Farquharson stated it had been brought down to 16*l*. 5*s*., while in the parish of Westmoreland it had been brought as low as 15*l*. 4*s*. for sugar and rum. For sugar alone on the above estates the cost was stated to have been 6*l*. and 7*l*. 7*s*. respectively. The percentage of extraction of juice on Jamaica estates is not given, neither are any data in regard to the recovery of sugar during the process of manufacture.

396. It is admitted, however, that the introduction of new machinery would assist to lessen the cost of production: also that an amalgamation of estates in some districts, and the erection of a central factory "would effect a considerable saving." It is pointed out that "except in the matter of crushing the cane, so

" long as rum remained as valuable or more valuable than sugar, " existing estate appliances involved no loss of the juice actually " obtained."

397. It would appear therefore that the circumstances of the sugar industry in Jamaica are of a special character. Hence they cannot be exactly compared with those existing in other sugar Colonies. The majority of the Jamaica estates are small (the average area in canes being only 178 acres) and they are also, for the most part, widely dispersed. The cost of management is therefore increased, but where rum is regarded as the chief crop the yield and quality of the sugar have not been considered of so much importance. In view, however, of the recent depreciation in the value of rum it is possible that more attention will have to be paid to the production of sugar. It will then be necessary to introduce better machinery and appliances, and, where circumstances permit, amalgamate several estates and erect central factories. In the district of Vere, where the soil is very fertile, but subject to periodical seasons of drought, it is proposed to construct irrigation works to supply the sugar estates with water. It is stated that such works would be of great utility in increasing the crops and maintaining them at a higher average than at present.

398. The position of the sugar industry as compared with other industries in Jamaica may be illustrated by the following table, in which the collective export value of sugar, rum, and molasses in certain years, is compared with the total exports from the Colony during those years :—

Years.	Total Value of Exports.	Collective Value of Exports of Sugar, Rum, and Molasses.	Percentage of Total.
	£	£	
1881–82	1,178,594	910,027	77·21
1882–83	1,549,058	777,928	50·21
1886–87	1,280,118	556,122	44·22
1887–88	1,509,010	490,840	32·52
1891–92	1,722,096	511,213	29·68
1892–93	1,759,807	432,739	24·59
1894–95	1,921,422	426,688	22·2
1895-96 ... — ...	1,873,106	360,059	19·17

399. These figures are taken from a return furnished by the Colonial Government. As, however, the values of the exports as given include goods in transit, the per-centages of sugar products to the total exports of products of the Colony would be somewhat higher than the table shows. For instance, the actual per-centages for 1895–96 would be 20·28 instead of 19·17.

400. The net result is that the collective value of the sugar products in Jamaica have, during the last fifteen years, fallen from over 77 per cent. to about 20 per cent. of the total value of the island produce exported.

401. During the same years the per-centage of Jamaica sugars exported to the United Kingdom and other countries was as follows :—

PERCENTAGE of SUGAR EXPORTED to the following countries.

Years.	United Kingdom.	United States of America.	Canada.	Other Countries.
1881–82	60·17	8·33	30·55	·95
1882–83	41·65	13·46	41·04	3·85
1886–87	9·19	83·00	6·01	1·8
1887–88	36·08	51·68	8·85	3·39
1891–92	·97	93·28	4·16	1·59
1892–93	5·16	89·18	4·03	1·63
1894–95	5·15	89·33	4·46	1·06
1895–96	13·83	82·43	2·46	1·28

402. From the above it will be noticed that since 1886–87 the United States of America have practically received the bulk of the sugar produced in Jamaica. Canada at one time received a large share, but latterly the shipments to that country have been of a trifling character. The shipments to the United Kingdom have been of a fluctuating character, but the general tendency has been to avoid sending sugars to London unless driven there by unfavourable conditions in the New York market.

403. The annual production of rum is a little over two million gallons. The exports have been almost entirely confined to the United Kingdom, the percentage being as high in some years as 94 per cent. and never below 82 per cent. Latterly, Germany has received a share of Jamaica rum ; the direct exports to that country in 1893 being as high as 11·08 per cent. ; in 1895–96 they were slightly lower, viz., 9·55 per cent.

404. Should the sugar industry in Jamaica be still more adversely affected by low prices, a number of small settlers will be affected as well as those interested in the sugar estates. Taxes were paid in 1895–96 on 5,064 acres in canes cultivated by peasants on their own account. It is possible that canes are also grown in small patches not specially enumerated. The Assistant Colonial Secretary states, "There are now over 6,000 "small sugar mills owned by the peasantry." These are, probably, cattle mills. Mr. Craig, in evidence, mentioned that the settlers "used to make a good quality of sugar, which, after "being drained, was generally used for local consumption. "Since the price has fallen, that class of sugar has almost gone "out, but still the small settlers make some sugar, and either sell "it in the local market or to the sugar estates." The price now is 12*s.* 6*d.* per barrel ; but, it is added, "it cannot pay to produce "it at that price." Cane-farming, as carried on in Trinidad, does not appear to have been tried, at least on an appreciable scale, in Jamaica.

405. The sugar estates in Jamaica have long enjoyed the privilege of obtaining new varieties of canes for experimental

cultivation. Since 1870, about 60 new varieties have been maintained under experimental cultivation by the Botanical Department at the Hope Gardens. These canes were obtained from Mauritius, Queensland, South United States, and some from Kew. Their characteristics were noted, their merits carefully investigated, and the results published in the annual reports of the Department. The most valuable canes were propagated and distributed to planters in quantities of hundreds at a time. Borer and fungoid diseases have fortunately not seriously affected the cane fields in Jamaica.

406. It is admitted by the Planters' Association that in "respect "to the science of agriculture . . . the Jamaica planters "generally are much behind the times." The great desideratum just now is "the appointment of an experienced agricultural "chemist . . . thoroughly accustomed to analysing the soil "and its products." If such a chemist could also co-operate with the Botanical Department in the investigation of canes under experimental cultivation, as is done by similar officers in British Guiana and Barbados, the sugar industry would thereby be materially benefited.

407. Since the days when Jamaica exported 150,352 hogsheads of sugar and over 5,000,000 gallons of rum,* the reduction in the extent and value of those commodities has been very considerable. In most cases the surviving estates represent those most suitable for being maintained in cultivation by such favouring circumstances as available capital, soil, rainfall, accessibility, and labour supply. Under normal conditions there would be no grounds for anticipating a considerable further reduction in the number and area of the sugar estates in Jamaica. It is clear, however, that with the exceptionally low prices now ruling for both sugar and rum, it will soon be impossible for many of the existing estates to maintain their cultivation; and if there is no change for the better within the next few years, according to the evidence, possibly 50 per cent. of these estates will be abandoned. Such a change must, for a time at least, adversely affect the circumstances of the labouring classes, and especially at a time when the demand for all tropical produce is exceptionally low. Jamaica, it is admitted, can bear such adverse circumstances with less disturbance of its prosperity than any other of Her Majesty's possessions in the West Indies; but while the present conditions of the sugar market exist, the true policy is obviously to safeguard the industry by every possible means. This may be done by the adoption of the most skilful and economical methods of cultivation and manuring, and by reducing the cost of manufacture within the narrowest limits. The sugar industry in Jamaica possesses appreciable advantages in its soil and climate, whilst its labour supply is, on the whole, abundant and effective. The value of its rum, though much reduced, is still higher than that produced in any other country. There should, therefore, with slightly improved prices, be no insuperable difficulty in maintaining most of the existing estates in cultivation.

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* In 1805.

408. The progressive condition of subsidiary industries in Jamaica, as compared with other parts of the West Indies, is due in the first instance to the favourable physical conditions existing in the island for the cultivation of numerous tropical products. These are supplemented by the existence of a population of nearly three-quarters of a million of sturdy workers.

409. Added to these, for more than a hundred years, valuable economic plants have been systematically introduced and distributed through every part of the island. For this purpose and for affording information regarding their cultivation, the island has maintained a Department of Gardens and Plantations under capable and experienced men who have carried on experiments, and, while supporting the old, have encouraged the starting of many new and promising industries. The average expenditure for industrial purposes on the Jamaica gardens, which are established at various elevations from sea-level up to 5,000 feet, during the last 30 years has not been less than 5000*l*. per annum. Further, the Government has fortunately been administered during that period by progressive and able Governors, who have consistently adopted a policy whereby it was possible to extend railways (185 miles), establish telegraph lines (685 miles), improve communication by main roads (1,879 miles) and parochial roads (3,600 miles), practically reaching every part of the island. A weekly steam communication has been maintained round the island, completing the circuit in 120 hours, while the steam communication with Europe and the United States, especially the latter, is frequent, and with one exception carried on without the payment of subsidies.

Public Gardens and Plantations.

[This Department has charge of the several establishments described below :—

1. The Botanic Garden, Castleton (established 1857-60), situated in the Parish of St. Mary, on the Junction Road connecting Kingston with Annotto Bay, 19 miles from Kingston and ten miles from Annotto Bay. This garden contains a large collection of native and foreign tropical plants. The chief features are the palmetum and a collection of economic, spice and fruit trees. (Elevation 580 feet. Annual mean temperature 76·2° Fah. Average annual rainfall 114·96 inch.)

2. The Hill Garden, situated in the Parish of St. Andrew, on the slopes of the Blue Mountains, about 20 miles from Kingston by way of Gordon Town. Established in 1867 for the experimental cultivation of Cinchona bark, which ultimately yielded returns of £17,000. European vegetables were also successfully introduced and the cultivation established amongst negro settlers. Latterly nurseries for timber trees and an experimental orange garden have been established. Olives, fruit trees, and tea have also been planted. (Elevation 3,500 to 6,300 feet. Annual mean temperature at 4,907 feet, 62·7° Fah. Average rainfall 105·31 inch.)

3. The Hope Garden, of about 220 acres, situated near the foot of the hills in the Liguanea Plains, five miles from Kingston. It has been determined to make this garden the chief Botanic Garden of the Island. The inner portion is being laid out as a Geographical Botanic Garden. Carriage drives of a total length of more than two miles have been laid out in this portion of the garden. There are large nurseries, containing about 40,000 plants, such as cacao, rubber plants, nutmeg, clove, black pepper, mango, vanilla, cardamon, sarsaparilla, cinnamon, Liberian coffee, &c. (Elevation 600 feet. Annual mean temperature 77·4° Fah. Average rainfall 52·83 inch.)

4. Kingston Parade Garden, the public pleasure garden of Kingston, kept up with shade and ornamental trees, flowering plants, tanks and fountains. (Elevation 60 feet. Annual mean temperature 79° Fah. Average rainfall 37·96 inch.)

5. Botanic Garden at Bath, the old Botanic Garden of the colony, established in 1774 : still maintained for the sake of its valuable trees and palms, though much reduced in size. (Elevation 170 feet. Temperature 78° Fah.)

6. King's House Gardens and Grounds contain about 177 acres, of which about 20 acres are kept up as an ornamental garden, attached to the official residence of the Governor. Many valuable economic plants and fruits trees are also under cultivation, as well as the rarer tropical palms. (Elevation 400 feet. Annual mean temperature 78·7° Fah. Average rainfall 49·20 inch.)

The Palisadoes Plantation occupies the long narrow strip of land enclosing Kingston Harbour, about five miles long, planted with about 23,000 cocoanut palms. This plantation is now leased and under the charge of the Crown Lands Department. (Annual mean temperature 80° Fah. Average rainfall 36·84 inch.)

The following outline of the history of the Botanical Department in Jamaica was contributed to the "*Handbook of Jamaica*" in 1881 by the writer of the present Report :—

Directly and indirectly during the last hundred years the Botanical Department has been the means of introducing and propagating some of the most valuable plants, now the sources of the staple products of the island, and its work in this respect is being increased year by year.

It is a striking fact that, with the exception of pimento—"that child of nature"—and a few others of comparatively little value, most of the staple products of the island are derived from exotics or plants introduced from other parts of the globe. It may be of interest to notice the simple, accidental, or more often direct influences by means of which valuable seeds and plants have been introduced into the island, the mere mention of whose names is sufficient to recall the vast influences they have exerted for good on the welfare and prosperity of the country.

The sugar cane though here in the time of the Spaniards was first cultivated by the English, by Sir Thomas Modyford, in 1660; but its most valuable variety, the Otaheite or Bourbon cane, was introduced in His Majesty's ships by Captain Bligh as late

as 1796. Coffee was introduced by Governor Sir Nicholas Lawes in 1718. The mango, brought by Captain Marshall of Lord Rodney's squadron in 1782, was first planted in Mr. East's Botanic Garden (Liguanea), and is now one of the commonest trees in the island. The plentiful and free-growing logwood was introduced from Honduras by Dr. Barham, a Botanist, the author of "*Hortus Americanus*," in 1715. The beautiful akee was obtained by Dr. Thomas Clarke, first Island Botanist, from a West African slave ship in 1778. The cinnamon came with the mango in Captain Marshall's ship in 1782, and was distributed from the Bath Garden by Dr. Dancer. The ubiquitous but graceful bamboo is also an exotic, and owes its introduction to Mr. M. Wallen, who brought it from Hispaniola and first planted it in the Parish of St. Thomas-in-the-East.* For the Cherimoyer we are indebted to Mr. Hinton East, who introduced it from South America in 1786: to Mr. East and his magnificent garden we also owe the jasmines and many species of lilies; many convolvuli; the oleander; the horse-radish tree; numerous roses; the trumpet flower: monkey bread; the camellia; *Calla æthiopica*; the weeping willow; the mulberry tree; the arbor vitæ, and the sweet scented mimosa. Dr. Clarke, on his arrival as Island Botanist in 1777, brought with him the jujube tree; and the litchi; the purple *Dracæna*; the sago palm and the valuable camphor tree: at the same time there came the now common "almond" tree; the tea tree, and the "sunn" hemp plant. The wanglo or zezegary was sent by Sir Simon Haughton Clarke in 1801. The nutmeg tree, first brought by Lord Rodney in 1782, was re-introduced by Dr. Marter in 1788, together with the clove and black pepper, for which he received the thanks of the House of Assembly and an honorarium of £1,000 The seeds of the valuable and now indispensable Guinea-grass were accidentally introduced from the West Coast of Africa as bird food in 1745. Scotch grass received its name from having been first brought to the island from the district of Scotland in Barbados.

Pindars were brought to Mr. East from South America; the afou, the acom and Guinea yam, and indeed all but one of the cultivated yams are from the Coast of Africa or East Indies. The seeds of the guango (*Calliandra Saman*) were brought over from the mainland by Spanish cattle. Cacao is indigenous to Central America. The shaddock was brought to the West Indies from China by Captain Shaddock, hence its name. The genip was brought to Jamaica from Surinam by one Guaf, a Jew. The ginger is a native of the East Indies, introduced to Jamaica by a Spaniard, Francisco de Mendiza. The locust tree and blimbing were brought to Jamaica from the South seas in His Majesty's

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* To Mr. Wallen, formerly owner of Cold Spring and Wallenford, the friend of Swartz and a successful botanist, we are no doubt indebted for the first plants of the buttercups, strawberries, water-cress, chick-weed, wild pansy, groundsel, dead nettles, dandelion, common honey-suckle, black-berried elder, evening primrose, nasturtium, common myrtle, the English oak, white clover and the sweet violet, now common on the Port Royal and Blue Mountains, being, possibly, escapes from his Garden at Cold Spring, which even in 1793 was well stocked with choice selections of introduced flowers and European trees and shrubs.—**Bryan Edwards, 5th Ed., vol. 1, p. 243.**

ship Providence in the year 1793. The orange, both sweet and Seville, the lime, the lemon and citron, were brought hither by the Spaniards. The Jerusalem thorn is from the Spanish Main. The prickly pear is a Mexican plant.

Returning to the history of the Department under review, it appears that the first public Garden established in the island was the old Botanic Garden at Bath. In the Journals of the House of Assembly, Vol. VIII., 1784–91, p. 602, mention is made of Dr. Thomas Clarke, "Practitioner in Physic and Surgery," who came to the island in 1777, at the particular instance and request of the late Sir Basil Keith, to superintend two Botanic Gardens, then intended to be established in the island. One was to be a European Garden, which, however, was never established, and the other was the "Tropical Garden" at Bath.

A private garden possessing many rare and valuable plants had already been formed by Mr. Hinton East in Liguanea (Gordon Town), which, on the death of the founder, became the property of his nephew, Mr. E. H. East, "who with great generosity offered it to the Assembly of Jamaica for the use of the public at their own price."

Mr. Bryan Edwards, in the *History of the British West Indies*, remarks that "the Assembly of Jamaica, co-operating with the benevolent intentions of His Majesty (to introduce valuable exotics and productions of the most distant regions to the West Indies), purchased in 1792–93 the magnificent Botanical Garden of Mr. East and placed it on the public establishment, under the care of skilful gardeners, one of whom, Mr. James Wiles, had circumnavigated the globe with Captain Bligh."

An interesting catalogue of the plants in this Garden, at the time of Mr. East's decease, was prepared by Dr. A. Broughton, and forms an appendix under the title of "Hortus Eastensis" to Bryan Edwards' *History of the British West Indies*, Vol. I. p. 475. From it we gather that as early as 1782 the mango, akee, cinnamon, camphor, jack tree, bichy or kola, date palm, rose apple, litchi, turmeric and many valuable plants, numbering nearly 600, had already been introduced into the island and were becoming thoroughly acclimatised.

From a letter addressed to Sir Joseph Banks by the Botanic Gardener, Jamaica, 1793, we gather that the breadfruit trees (introduced in 1788) "were upwards of 11 feet high, with leaves 36 inches long, and the success in cultivating them has exceeded the most sanguine expectations; the cinnamon tree is become very common, and mangoes are in such plenty as to be planted in the negro grounds. There are, also, several bearing trees of the jack or bastard breadfruit . . . and we have one nutmeg plant." *

The Botanic Garden at Liguanea continued to be under Mr. Wiles' care (superintended by a Committee of the House of Assembly) for many years, while that at Bath was entrusted to

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* For services in introducing the Bread Fruit Tree 1,000 guineas were granted in 1793 to Captain Bligh and 500 guineas to Lieutenant Portlock.

Dr. Dancer as Island Botanist. The allowance for the two Gardens was fixed at 800*l*. The duties of the Island Botanist were defined as follows: "To collect, class and describe the native plants of the island; to use his endeavours to find out their medicinal virtues; to discover if they possess any qualities useful to the arts, and annually to furnish the House with a correct list of such plants as are in the Botanic Gardens, together with such information as he may have acquired relative to their uses and virtues."

For the purpose of distributing the breadfruit and other valuable plants from the Botanic Garden the Committee of the House "appointed several Committees for each county, to receive and distribute the allotments destined for them," and, according as sufficient numbers were prepared for propagation, the Chairmen of the County Committees were apprised and their respective proportions delivered and distributed, "by which means," it is quaintly stated, "the public has derived all the advantages to be expected from these establishments."

During the years 1791–1807 the Committee in charge of the Botanic Gardens, with Mr. Shirley as Chairman, greatly developed and improved them. Inquiries were made everywhere for new products: thanks and gratuities were voted for the introduction of valuable plants; and these were cultivated and distributed with great assiduity and care. In order to make the island less dependent on America for supplies every encouragement was given to the cultivation of yams, cocoes, maize, plantain, and such products as the breadfruit, zezegary or wanglo, nutmeg, clove, cinnamon, pindars and coffee, it being believed that the "cultivation of these valuable exotics will, without doubt, in a course of years lessen the dependence of the Sugar Islands on North America for food and necessaries; and not only supply subsistence for future generations, but, probably, furnish fresh incitements to industry, new improvements in the arts, and new subjects of commerce."

These beneficial efforts, long and successfully maintained, were however greatly relaxed after the year 1807, and under the influence of domestic troubles, want of due appreciation of the value and nature of Botanic Gardens, and the need of strict economy, a bill was introduced into the House of Assembly in 1810, "for vesting the Botanic Garden in Liguanea in the Commissioners of the Board of Works, to be sold and the money to be brought to the credit of the public." This bill was finally passed in December, 1810, and, the Garden passing to private hands, many of the valuable plants contained in it, and collected with so much care and industry, were entirely lost. (*b*)

The Garden at Bath was however maintained, though in a very reduced state. Dr. Stewart West acted for some time as Island Botanist and was engaged in collecting the plants that had been lost from the Gardens, for the purpose of propagating and distributing them.

(*b*) Gordon Town is still known as "The Gardens."

In the year 1824 an effort was made to restore the value and usefulness of the Botanic Gardens, and a Committee appointed to inquire into the state of the Botanic Garden. Sir M. B. Clare, reported: "That the Botanic Garden in St. Thomas-in-the-East, established more than fifty years ago, has during that period received and transmitted for propagation throughout the island many valuable plants. That the Royal munificence of his late Majesty promoted the object of this institution by vessels-of-war employed to collect plants in the settlements of the east and south seas, some of which are now naturalized in this island, and more might be added, greatly to the advantage of its inhabitants. Your Committee, therefore, recommend that proper care may be taken to preserve the valuable plants which the Garden now contains. That in addition to the above considerations, your Committee are of opinion that one object of this institution of chief importance has never been properly attended to, namely, the investigation of the many unknown native plants of this island, which, from the properties of those already known, it is reasonable to infer would prove highly beneficial in augmenting our internal resources, by supplying various articles either for food, for medicine, or for manufactures, to be cultivated, prepared and exported as staple commodities, by which great commercial advantages might be obtained; among others the various vegetable dyes claim particular attention as promising a fruitful field for discovery. That it appears to your Committee that the person fit for undertaking such inquiries ought to be a well educated and scientific man, combining with his botanical knowledge sufficient information in experimental chemistry to enable him to discover the useful qualities of such indigenous plants, and improve the productions of those already known; but at the same time your Committee strongly recommend that such person should not be a medical man, as his whole time and attention ought to be applied to promote the above objects. Your Committee recommends to the House to instruct the Commissioners of Correspondence to direct the Agent to apply for such a person to the President of the Linnean Society in London." As a result of this proposal Mr. James Macfayden was selected and approved of as a Botanist and arrived in the island in 1826.

At the same time it was felt that the Botanic Garden at Bath was too distant from Kingston and the seat of government to answer the intention proposed, and it was recommended that a bill be brought in for purchasing a proper place for such a Garden in the vicinity of Kingston or Spanish Town.

This proposal was, however, never carried into execution, and on the death of Mr. Macfayden, the Garden at Bath, "fast falling to decay," was placed in charge of Mr. Thomas Higson; his petitions addressed to the House of Assembly during 1830–32 shew that the allowances made were not sufficient for the maintenance of the Garden even in its reduced state, and that no remuneration had been made to him for its superintendence.

In 1833, in another fit of economy, owing to domestic troubles and the need for further retrenchment, a Committee was appointed to "report on the best means of diminishing the contingencies

and expenditure of the island and to consider whether the Botanic Gardens at Bath could be sold for the benefit of the public." The report was made at the close of the year and ordered to lie on the table. Nothing further, however, appears to have been done until 1840, when the sum of 300*l.* was "voted for the improvement of the Garden at Bath, and for the services of a Botanist." This sum, afterwards reduced to 200*l.*, was placed in the hands of the members of St. Thomas-in-the-East, Portland and St. David, by whom it was administered down to the year 1852, when the Garden was transferred to the Board of Directors of the Bath of St. Thomas the Apostle. The late Mr. Nathaniel Wilson, from the Royal Gardens, Kew, was appointed Curator of the Garden in 1847, and devoted many years, often labouring under great discouragements, in maintaining and improving the Garden and introducing new plants. His yearly reports contain sufficient evidence of the value of the Garden, small as it was, to an island entirely dependent for its prosperity on its agricultural interest: and assisted and encouraged by the Rev. Thomas Wharton, Mr. Wilson laboured most successfully in the propagation and distribution of valuable plants, and especially in developing the "fibre" resources of the colony.

Writing in 1861 Mr. Wilson referred to the successful introduction of seeds of the valuable cinchona tree to Jamaica, "through the liberality of the British Government and recommendation of Sir W. J. Hooker, of Kew." By the month of October, 1861, Mr. Wilson reported that he had "over four hundred healthy plants quite ready for planting out." As the climate of Bath was unsuitable for the successful growth of cinchona, by the kindness of the late Dr. Hamilton, they were tried at Cold Spring Coffee Plantation, St. Andrew, at an elevation of 4,000 ft. Here Mr. Wilson found "the climate and soil to be all he could desire, and as it afforded every facility for carrying out so valuable an experiment he at once availed himself of it, and planted out in the coffee fields, on the 16th November, 1861, several plants of each species, then about two and two and a-half inches in height. In twelve months after, a plant of the red bark (*Cinchona succirubra*) had attained to the height of forty-four inches, with leaves measuring thirteen and a-half inches long by eight and three-quarters inches broad. The same plants in December, 1863, *i.e.*, when two years old, measured six feet in height, with ten branches, having a circumference of stem at the base of four and a-half inches. It may be mentioned that since that time the export of cinchona bark from the Government Plantations to the 30th September, 1884, was 73,533 pounds, of the value of 16,327*l.* There was no exportation in 1885. A consignment of 150 bags of various qualities was despatched to London in December, 1886. The bark weighed 17,009 pounds, and was sold for 542*l.* 9*s.* There has been no export since that time.

In 1857 a grant was passed by the Legislature for purchasing land for a Botanic Garden at Castleton, in the parish of St. Mary, 19 miles from Kingston, and steps were at once taken to establish the garden and remove such plants as could be spared from

Bath. In 1862–63 a grant was made for the salary of an assistant gardener to Mr. Wilson, and Mr. Robert Thomson, formerly of Kew, received the appointment.

The Garden at Castleton was then finally established, and ultimately, by the influence of Sir John Peter Grant, the Government Cinchona Plantations were opened in 1868, and placed under the management of Mr. Thomson, who, on Mr. Wilson's retirement, had been appointed superintendent.

Mr. Thomson retired on pension in 1878, and in December, 1879, the Botanic Gardens, which had been placed under the administrative control of the Office of Public Works, were entirely re-organized, and Mr. D. Morris, M.A., F.L.S., assistant director of the Botanical Gardens in Ceylon, was appointed the first director. In 1886 Mr. Morris was promoted to the post of assistant director of the Royal Gardens at Kew, and he was succeeded in Jamaica by Mr. William Fawcett, B.Sc., F.L.S., of the Natural History Department of the British Museum. Mr. Fawcett still remains in charge. He has lately been appointed a member of the Legislative Council.

In the Report of the Royal Finance Commission of 1882, the Department was referred to as follows :—

"In a purely agricultural country like Jamaica a well organized Department of Gardens and Plantations is invaluable, not only for introducing and propagating such plants as are most suitable to the climate and soil, but also for the dissemination of the knowledge requisite to cultivate the products of the island to the best advantage. We found that this Department has done good work, and the public appreciation of the opportunities afforded by it is spreading fast."

The following is a copy of the Estimates for the maintenance of the Public Gardens and Plantations in Jamaica for the year ending 31st March, 1896 :—

Sub-heads under which the vote is accounted for by the Director of Public Gardens and Plantations.

—	1895–96.			1896–97.		
	£	*s.*	*d.*	£	*s.*	*d.*
A.—Head Office—						
a. Salaries	1,649	5	0	1,705	0	0
b. Services	2,793	19	0	2,847	6	0
B.—Hope Garden	1,130	0	0	1,130	0	0
C.—Hill Garden and Orange Experimental Garden	550	0	0	550	0	0
D.—Castleton Garden...	410	0	0	410	0	0
E.—Parade Garden	266	0	0	516	0	0
F.—King's House Gardens	500	0	0	500	0	0
G.—Bath Garden	50	0	0	50	0	0
Total	7,349	4	0	7,708	6	0

Details of the above.

—	1895–96.			1896–97.		
A.—Establishment.	£	*s.*	*d.*	£	*s.*	*d.*
a. Salaries :—						
Director of Public Gardens and Plantations...	600	0	0	600	0	0
Reimbursement for Travelling Expenses ...	109	5	0	150	0	0
Clerk	140	0	0	150	0	0
Superintendent at Hope Garden	200	0	0	200	0	0
,, at Hill Garden	200	0	0	200	0	0
,, at Castleton Garden	200	0	0	200	0	0
,, at Parade Garden	100	0	0	100	0	0
,, at King's House	100	0	0	105	0	0
Total for Establishment ...	1,649	5	0	1,705	0	0
b. Services—						
Library	60	0	0	60	0	0
Herbarium. Assistant in charge	80	0	0	80	0	0
,, Collecting Plants for Gardens and Herbarium.	70	0	0	70	0	0
Messengers and Office contingencies	75	0	0	75	0	0
Importation and exchange of Plants	100	0	0	100	0	0
Postages	100	0	0	100	0	0
Stationery, including Printing of *Bulletin* ...	150	0	0	150	0	0
Furniture	8	19	0	32	6	0
* Instruction in Cultivating and Curing of Economic Plants.	150	0	0	150	0	0
Transfer of head quarters to Hope Gardens. removing office furniture, etc.	2,000	0	0	2,000	0	0
Total	2,793	19	0	2,847	6	0
B.—Hope Gardens—						
Formation and maintenance of Garden, including Nurseries and Propagating.	960	0	0	960	0	0
Water supply	120	0	0	120	0	0
Carts, Harness, Tools	50	0	0	50	0	0
Total	1,130	0	0	1,130	0	0
C.—Hill Garden—						
a. Maintenance	235	0	0	235	0	0
b. Orange Experimental Garden	300	0	0	300	0	0
Tools and contingencies	15	0	0	15	0	0
Total	550	0	0	550	0	0
D.—Castleton Garden—						
Maintenance of Garden	330	0	0	330	0	0
Propagating Plants	50	0	0	50	0	0
Replacing Soil and Manuring	20	0	0	20	0	0
Tools and contingencies	10	0	0	10	0	0
Total	410	0	0	410	0	0
E.—Parade Garden, Kingston						
Maintenance	221	16	0	221	16	0
Fencing round Grass Lawns		...		250	0	0
Water supply	34	4	0	34	4	0
Carts, Harness, Tools	10	0	0	10	0	0
Total	266	0	0	516	0	0

* Under authority of resolution of Council of 1891.

—	1895-96.			1896-97.		
	£	s.	d.	£	s.	d.
F.—King's House Gardens—						
Maintenance	485	0	0	485	0	0
Carts. Harness. Tools	15	0	0	15	0	0
Total	500	0	0	500	0	0
G.—Bath Garden—						
Maintenance	50	0	0	50	0	0
Total	50	0	0	50	0	0

The following are some of the principal works treating of the Botanical and Economic resources of Jamaica:—

A Voyage to the islands Madeira, Barbados, Nieves, S. Christophers and Jamaica, with the Natural History of the herbs and trees. By Hans Sloane, M.D. 2 vols. London, 1707.

The Civil and Natural History of Jamaica. By Patrick Browne, M.D. Illustrated with 49 copper-plates, by George Dionysius Ehret. London, 1789.

Hortus Jamaicensis, or a Botanical Description, and an account of the virtues, &c., of its indigenous plants hitherto known. By John Lunan. 2 vols. Jamaica, 1814.

Flora of the British West Indian Islands. By A. H. R. Grisebach, M.D., F.L.S., Professor of Botany in the University of Gottingen. London, 1864.

Handbook of Jamaica. 1881.

Ferns of Jamaica (W. Nock), pp. 143-148.
Orchids of Jamaica (G. Syme), pp. 148-150.
Poisonous Plants of Jamaica (J. J. Bowrey), pp. 150-152.
Cultivation of Sugar Cane (De B. Spencer Heaven), pp. 154-162.

Institute of Jamaica.

Lectures on Objects of Productive Industry (Series 1), 1881. [Root foods, Coffee, Cinchona, Timbers of Jamaica, Stock raising, Mineral springs.]

Cacao: How to grow and how to cure it. D. Morris. 1882.

Lectures on Objects of Productive Industry (Series 2), 1884-85. [Native and Fibre Plants, Cultivation of Ramie, Cultivation of Orange, Vine and its Culture, Vegetable Chemistry.]

Lectures on General Agriculture. 1893. [Treatment of Soil, Plant Life, Farm Animals, Agricultural Pests.]

Jamaica in 1887. A handbook of information respecting the climate, agriculture, and works of reference on the island. 1897.

Fawcett, William. Index to Economic Products of the Vegetable Kingdom in Jamaica. Kingston, 1891.

Jenman, G. S. Synoptical List, with descriptions of the Ferns and Fern Allies of Jamaica. Bulletin Botanical Department, 1890-93 ; New Series, 1894-1897.

Bulletin of the Botanical Department, Jamaica. Edited by William Fawcett, B. Sc., F.L.S., Director of Public Gardens and Plantations. Vols. I.-IV. (in progress).]

410. According to Bryan Edwards, Jamaica had nearly attained the meridian of its prosperity in 1787, just 110 years ago.* It would be useful to contrast the quantity and value of its exports in those days with the exports of to-day. The following table enumerates the principal articles of export, with their total value in 1787 and 1896 respectively :—

Articles.	1787.		1896.	
	Quantity.	Total Value.	Quantity.	Total Value.
		£		£
Sugar	42,028 tons		22,995 tons	
Rum	2,543,025 gallons		1,881,100 gallons	
Molasses	6,416 „		—	
Pimento	5,504 cwts.		97,347 cwts.	
Coffee	6,795 „		84,391 „	
Cacao	82 „		10,370 „	
Ginger	4,816 „		10,310 „	
Cotton	1,906,467 lbs.		—	
Indigo	27,623 „	2,283,728	—	1,775,016
Tobacco	18,140 „		15,297 lbs.	
Mahogany	5,878 tons		—	
Logwood	6,701 „		84,477 tons	
Fustic	—		32,597 „	
Fruit	—		Value, 536,811*l.*	
Miscellaneous products ..	Value, 147,236*l.*		—	

411. From a study of this interesting table it will be noticed that, with the exception of cotton, indigo, and mahogany, all the principal industries of 1787 remain to this day. The new industries are fustic and fruit, including bananas, oranges, cocoa-nuts, grape-fruit, limes, &c. As regards the total value, if the price of sugar in 1787 (about 40*l.*) is compared with its present price (10*l.*), that alone would probably account for the difference between 2,283,728*l.* and 1,775,016*l.*

It is evident, however, that at a later period than 1787 the Jamaica exports (but whether all island produce is not mentioned) reached a much higher value than given above. It is stated, for instance, that the average annual value of the staple exports for the five years immediately preceding the abolition of the slave trade (1807) was larger than in any preceding years, being 3,852,621*l.*: the average annual value for the five years ending in 1815 was 3,588,903*l.*; while for the five years ending in 1833 (the last five years of slavery) they had dropped to 2,791,478.† It is

* *Jamaica Handbook*, 1881, p. 348.

† *Jamaica Handbook*, 1881, pp. 349–350.

satisfactory to find that, notwithstanding the immense depreciation in the value of its staple productions, and in spite of the series of economic changes of exceptional severity through which it had passed, Jamaica is still in a comparatively prosperous condition as compared with 110 years ago.

The capacity for further development is undeniable, for only about one-fourth of the cultivable area is actually under crops. If, as is possible under suitable circumstances, the value of either the sugar crops or the fruit trade were doubled, Jamaica would then be in as prosperous a condition as regards the money value of its exports as it ever was in the days of slavery. But as regards the general comfort of the inhabitants, their social condition, and civic efficiency, Jamaica is undeniably in a better position than it ever was before.

Coffee.

412. The largest coffee crop shipped from Jamaica was in 1814, when 272,321 cwts. were exported. This was more than three times the quantity shipped in 1895–96. Jamaica coffee is of three well-marked qualities. The sort that obtains the highest prices is grown on the southern slopes of the Blue Mountains, at elevations of 3,000 to 5,000 feet. The area for new plantations is now very limited. The quantity produced is small (probably not one-third of the whole), but the average prices are from 100*s.* to 142*s.* per cwt. The next sort is estate coffee, grown in the mountains of Manchester and St. Ann's, at elevations of 1,500 to 2,500 feet. This obtains prices from 65*s.* to 90*s.* per cwt. A large quantity of Jamaica coffee is grown in small patches by peasant settlers. This is badly cured, and is sold to local merchants. It usually fetches only one-half the price of estate coffee. The prices recently have been 35*s.* to 45*s.* per cwt. It has been shown that if the settlers were provided with a central factory, worked by people who thoroughly understood the curing of coffee, the value of the produce would be increased at least 20 per cent. "Assuming "that two-thirds of the coffee raised in Jamaica is settlers' coffee, "and taking the loss on account of defective curing at 20*s.* per "cwt. there is here an annual actual loss to the island of "nearly 200,000*l.*"

413. There is another point: it has been conclusively proved that a good deal of abandoned land in the Blue Mountains and elsewhere can be made productive by judicious cultivation and manuring. In fact, portions of old coffee estates, bought by settlers, have latterly been brought into an excellent state of cultivation. The crops are sold in the cherry to the neighbouring plantations, which thus act as central factories. Coffee cured in this manner fetches prices in some cases equal to good Blue Mountain coffee. There is evidently a promising field for development in this direction, both in the Blue Mountains and in the coffee districts of Manchester and St. Ann's.

414. Liberian coffee, already fully noticed in connection with the other West Indian Colonies, is being largely taken up in Jamaica. It will grow in sheltered localities with a moist climate even on some of the old sugar estates. It is more hardy, and

consequently less subject to disease, than the Arabian coffee, and the return per acre is only a little less valuable. It is the most suitable coffee to be established under the shade of bananas in the north-eastern districts of the island.

There is a large number of Liberian coffee trees established for many years at the Castleton Gardens. These now produce crops of cherries sufficiently large to supply seed to the whole island. Although, at present, the price of this and Arabian coffee has fallen to the lowest point for 15 years, this fact should not discourage the cultivation in suitable localities in Jamaica. It should only enforce greater care in the selection of the land, and the most rigid economy in the work of cultivation. As in former periods, the price will no doubt rise, and well-established coffee properties should become as valuable as they have ever been.

Fruit Trade.

415. The fruit trade between Jamaica and the United States, which is now the most important industry in the island, was started in 1869 by the efforts of Captain Bush, who, after one or two experimental ventures, loaded seven vessels with fruit from Port Antonio. Ten years later (1879) the value of the fruit shipped was 22,939*l*. By the end of the next ten years (1889), owing to a subsidy of 5,000*l*. granted by the Government to the Atlas Steamship Company, it had increased to a value of 320,323*l*., while last year, 1895–96, it attained a value of 536,811*l*. It now constitutes 30 per cent. of the total value of the exports of the Colony; sugar constitutes 11 per cent., and rum 9·3 per cent.

416. The following is a detailed list of the fruit and fruit products exported from Jamaica in 1895–96 :—

Fruit.	Quantity.	Value.
		£
Bananas	4,220,796 bunches	316,560
Cocoa-nuts	9,443,452	37,774
Oranges	97,925,398	169,794
Grape-fruit	7,045 boxes	5,832
	7,253 barrels	
Shaddocks	211 „	118
Tangerine oranges... ...	436½ boxes...	120
	19 barrels	
Limes	87½ boxes...	768
	1,767 barrels	
Lime juice	128,483 gallons	4,818
Pine-apples	4,192 dozens...	524
Unenumerated fruits	387 packages	185
Tamarinds (preserved)	53 kegs	27
Kola-nuts	11,609 lbs.	291
Total value		£536,811

417. Most of the fruit so far shipped has gone to New York, Philadelphia, and Boston. This valuable trade was started on very simple lines. At first the fruit was purchased in small

quantities from negro peasants in the neighbourhood of Port Antonio. There was practically no capital invested in the cultivation. The settlers were induced to grow bananas in small patches of an acre or two and to deliver the fruit at the port of shipment. In the aggregate these small patches produced bananas sufficient to fill all the first ships engaged in the trade. The fruit trade in Jamaica is now the means of circulating nearly 500,000*l.* annually amongst all classes of the community, and this large sum is immediately available in establishing other and more permanent industries. Bananas come into bearing at the latest in about 15 or 18 months from the time of planting, and as the return is usually from 10*l.* to 20*l.* per acre, the planter is able, with a comparatively small capital, to establish his land in cacao, coffee, nutmegs, limes, oranges, and cocoa-nuts, which, when the bananas are exhausted, will remain a permanent source of revenue. It is on this account that the fruit trade has always been regarded as capable of building up, little by little, an improved condition for the people, not only of Jamaica, but of other West Indian Islands suitable for the industry. Latterly, many sugar estates have been converted into banana walks, and all sections of the community have taken part in the enterprise.

418. The capabilities of Jamaica to ship large quantities of delicious oranges is a most striking proof of the resources of the island. Hitherto hardly any orange trees have been systematically cultivated, yet there are several millions of trees existing in a semi-naturalised condition all over the island. From these trees the export of fruit ten years ago (1886–87) was of the value of 58, 288*l.* Last year (1895–96), owing to the falling off of supplies from Florida, there arose a sudden and keen demand for Jamaica oranges in the United States with the result that the total shipments within a few months reached the value of 169,273*l.* This may not be maintained in future years ; but it is evident that the island can furnish almost any tropical produce provided intelligence and care are brought to bear upon the cultivation and suitable means adopted for shipping the produce.

419. The grape-fruit is a member of the orange tribe that has lately come into great favour in the United States. It is a fruit allied to the shaddock, but smaller, and with a finer flavour. It is regarded as very wholesome and refreshing, and possessing valuable tonic properties. Fortunately trees yielding this fruit were already plentiful in Jamaica, and the island was at once able to meet the demand. Last year the value of the exports was nearly 6,000*l.* It is probable that it may eventually be more profitable to grow the grape-fruit than the orange.

420. The cultivation of pine-apples for the United States market is greatly influenced by the extent and value of the cultivation carried on in Cuba, Bahamas, and in the more tropical parts of Florida. At present there is an increasing demand in the United States owing to the falling away of exports from Cuba. This may suggest the desirability of giving greater attention to the subject in Jamaica. In the Liguanea plains the conditions are very favourable for pine cultivation, but the subject has not been taken

up in such a systematic manner as it deserves, and there is not sufficient care taken to select and pack the fruit for export purposes.

421. Owing to the personal interest taken by the present Governor of Jamaica, Sir Henry Blake, in grape culture, this cultivation is making considerable progress in the neighbourhood of Kingston. It may be possible, after local wants are supplied, to ship grapes in the winter months to New York, where they would command good prices.

422. A fruit known as the tree tomato, a native of Peru, has become naturalised in Jamaica, and is esteemed for its tonic properties. This may eventually become a valuable subject for export. At present it is little known.

423. The supply of new potatos, tomatos, and other fresh vegetables for winter use in America is receiving some attention in Jamaica. With the numerous ships now communicating with the island it may be possible to create a valuable trade in these commodities.

424. Attempts are now being made to organise a fruit trade between Jamaica and England, by means of ships fitted with refrigerating chambers and capable of performing the voyage within 14 to 16 days. Owing to want of experience and to unforeseen circumstances, the results at first were not so successful as could be wished. There is, however, little doubt that before long Jamaica fruit will be regularly shipped to this country. According to the *Fruit Grower*, a shipment of between 4,000 and 5,000 bunches of Jamaica bananas arrived in the "Port Pirie" at the West India Docks on the 5th April last. It was stated to have "realised the highest anticipations of all concerned." In Covent Garden Market 1,500 bunches were sold at prices varying from 12*s.* to 6*s.* 6*d.* per bunch, "at Manchester the sales were at 5*s.* to "7*s.* per bunch, . . . at Hull . . . 220 bunches met a "ready sale at 5*s.* 6*d.* to 10*s.* 6*d.* per bunch, . . . the condition "was described as 'very good,' . . . at Glasgow some fruits "were sold privately at such high prices as 14*s.* to 16*s.* per "bunch."

It is believed that there is a better market for Jamaica bananas in England than in the United States. Hence the possible development in this direction is very considerable.

425. Besides bananas there is a favourable opening in this country for oranges and pine-apples. In both cases it is essential that only the best fruit be selected for shipment. It should also be packed in suitable cases and presented in as attractive a condition as possible. Last winter some of the Jamaica oranges fetched higher prices than any in the English market. It has been suggested that all produce of this kind should be inspected by a competent Government officer before shipment, and all inferior and badly packed fruit rejected. This practice is becoming generally adopted for agricultural produce both in the United States and in Australia. There is no doubt of its value in maintaining a high standard of quality; and it has been found to be the only effective check in preventing loss and disappointment both to the shippers and consignees. There may

be difficulties at first in introducing such a system into Jamaica, but as its working elsewhere has stood the test of many years its practicability and advantages cannot be doubted.

Cacao.

426. Cacao cultivation was introduced into Jamaica by the Spaniards. In 1671 there were 65 walks in bearing and many new ones in cultivation. These had practicably disappeared soon after the English occupation. The present cultivation is only about 30 years old The following table, showing the value of the exports since 1876, illustrates the gradual growth of this industry :—

——	1876.	1880.	1885.	1890.	1896.
Value	£ 1,286	£ 10,918	£ 9,715	£ 14,539	£ 17,528

427. Cacao cultivation has been greatly fostered by the Botanical Department by the introduction of seeds of the best varieties from Trinidad, Grenada, and Venezuela. The officers of the Department have also given special lectures and demonstrations on the pruning and curing of cacao, and by these means the quality of the produce has steadily improved. In Jamaica a cacao estate can very economically be established concurrently with the cultivation of bananas for export. It is estimated that all the working expenses, up to the end of the fourth or fifth year, can be cleared by the profit arising from the sale of the bananas. This fact is full of encouragement to those intending to take up cacao cultivation, and it suggests means whereby thousands of acres of land formerly in sugar may be utilised for a permanent and remunerative industry.

Pimento.

428. Jamaica pepper, pimento, or "allspice" appears in commerce as small dry berries resembling black pepper. They have a warm aromatic flavour, and are used as a spice. The tree is indigenous to the island, and its cultivation is of the simplest character. The plants are established from seeds distributed by birds, and require only to be thinned and kept free from weeds. The crop is irregular in quantity, and the price of late years has been exceptionally low. The expenses are correspondingly low. The value of the pimento exported from Jamaica (the only country that produces this spice) is shown below :—

——	1876.	1880.	1885.	1890.	1896.
Value	£ 39,973	£ 145,568	£ 85,694	£ 81,321	£ 90,046

429. Under the shade of the pimento trees cattle are raised on a rich grass, called pimento grass, that thrives on dry limestone soil. Pimento may therefore be regarded as only a bye-product on lands usually devoted to stock raising.

Ginger.

430. Ginger is another industry that is specially associated with Jamaica. This can be grown in almost every part of the tropics; but the ginger grown in the rich soils in the mountains of Jamaica usually fetches the highest prices. What is commercially known as *common* Jamaica ginger has lately risen from 51*s.* to 74*s.* per cwt., while *good* qualities have risen from 62*s.* to 98*s.* 6*d.* per cwt. These prices are due to the exceptionally large proportion of oil contained in the rhizomes. The cultivation is an exhausting one, and land that has borne a few ginger crops has hitherto been abandoned as useless. Efforts are now being made to restore fertility to these lands by the use of suitable manures. In an experiment carried on by the Jamaica Agricultural Society at the suggestion of the Governor, good crops of ginger have been produced on abandoned lands. If this is confirmed by further trials, one of the most important problems connected with the maintenance of the ginger industry will have been satisfactorily solved.

431. It is needless to pass in review all the numerous other industries now existing, or capable of being called into existence, in Jamaica. The exports of annatto, lime juice, tobacco, dye woods, bitter-wood, lancewood spars, satinwood, ebony or cocos wood, lignum vitæ, walking sticks (from thinnings of pimento trees), divi-divi, tamarinds, sarsaparilla and nutmegs are already more or less prominent. They could be greatly increased at any time if special attention were devoted to them. There are also medicinal plants, essential oils, spices, such as cardamons, black-pepper, cinnamon, and vanilla, coca, sisal hemp, cassava, chillies, castor oil, papain (the dried juice of the papaw), and cinchona barks. All of these already exist in the island, and are only waiting for favourable circumstances to be developed into important industries.

Instruction in Agriculture.

432. In Jamaica there exists a larger body of landholders than possibly in any other part of the West Indies. This is variously estimated at numbers ranging from 90,000 to 100,000. There are no doubt many persons who have more than one holding, but it is probable that one in every ten persons in Jamaica is possessed of land. Also, that in the majority of cases, this land is capable of being systematically cultivated and of yielding crops. It is this special circumstance in the economic condition of the island that renders it necessary that the peasant proprietors should be taught how to make the best use of their land, and produce articles, not only in general demand, but yielding remunerative prices. Most of these articles require for their successful manipulation a certain amount of skill and aptitude on the part of the cultivator.

Men who have hitherto performed only the rough work of hoeing and weeding canes cannot be transformed at once into competent fruit or coffee growers. It is necessary, therefore, to educate the people in right methods of growing, pruning, and manuring plants, and in preparing the produce in a careful and attractive manner. It is admitted that the work of training agriculturists of this character must be begun, theoretically, at least, in the elementary schools of the country, and it must be extended so as to reach all classes of the community. Further, scientific agriculture must be taught in all the higher schools and colleges. It is only by steady continuance in such efforts as these that the character of practical agriculture can be improved in the island, and that the people can be rendered capable of responding to the requirements of the markets of the world.

433. Assistance by grants, varying from 1*l.* to 10*l.* per annum, is offered by the Education Department to elementary schools for the teaching of agriculture as a special subject. In addition, all country schools are expected to teach the elementary principles of agriculture as a part of the general course. Recently the Board of Education has brought out, through Messrs. Blackie and Son, two Jamaica Readers, the use of which will be compulsory in all schools. These Readers are likely to be of valuable service in instilling correct principles of agriculture into the minds of the children of the country, and making it comparatively easy for them to benefit later by instruction in the proper modes of cultivation of any particular crop; or, eventually, in special cases, to take up the systematic study of agriculture as a science. A supplementary Reader in Tropical Agriculture is also in contemplation.

434. The requirements to qualify for grants given to elementary schools in the first stage (Class A) are that the elements of scientific agriculture are satisfactorily taught and illustrated by practical experiments on a small scale by the teacher and observed by the children. A very small plot of land, or some earth in flower pots, boxes, or barrels, will be accepted as sufficient to conduct the illustrations required in this stage. In the second stage (Class B) the elements of scientific agriculture must be intelligently taught and illustrated by practical work in the field done by the children and directed by the teacher. In this case (1) a plot of land of at least a quarter of an acre in extent must be provided; (2) this plot must be surrounded by a good and sufficient fence, and the possession of it legally defined: (3) the kind of plants to be cultivated, and the exact number and kind of tools required, must be decided by the Department on the report of a qualified person. Special credit will be given for the cultivation of economic plants not generally grown in the district. All the cultivation must be conducted on improved scientific methods, and not on the lines of the ordinary unscientific cultivation usually practised in the island.

435. In training colleges for teachers the principles of botany and agriculture are required to be taken up in the second year course, including the supply of plant food, manure as a supplemental source of plant food, the principles regulating the growth of crops, and the variation in their yield and quality.

436. Practical demonstrations and lectures are regularly delivered in certain districts by the officers of the Botanical Department. These include such important points as the cultivation and preparation for market of coffee, cacao, oranges, kola, and grapes, the methods of dealing with various kinds of soils by digging, draining, liming, and manuring. It is stated that, although "these demonstrations are chiefly intended for small settlers, it "is gratifying to find that they are attended also by owners of "estates." The Botanical Department issues a monthly *Bulletin* dealing with agricultural and horticultural subjects of local interest, and gives hints with regard to the treatment of insect and fungoid diseases of plants, and the cultivation and curing of all agricultural products likely to be suited to the island. Further, an industrial school is attached to the Hope Gardens, where the boys attend school for two hours, daily, and at other times receive practical instruction from the superintendent in pruning and budding and in the details of the routine work of the garden. Much good is likely to arise from this practical teaching, and especially if arrangements are made to retain the boys who show special aptitude, as apprentices in the gardens, after they have attained the age at which they must leave school. Apprentices from Lagos were lately trained at Jamaica for service on the West Coast of Africa. These are now engaged in agricultural work in their own country.

437. There is also the question of higher agricultural education necessary to instruct those who may afterwards become managers and proprietors of estates and fit them for availing themselves of the results of modern advances in improving local agriculture. This work will necessitate that provision be made for laboratories and instructors attached to the present high schools and colleges, where scientific agriculture could be systematically taught in conjunction with field work and experiments. Referring to this subject the Headmaster of the High School in Jamaica writes as follows in the *Journal of the Agricultural Society* for May 1897 :—

"I have endeavoured to show that whatever else it may, or may "not, be wise to do, the primary and the greatest need is the "introduction of the scientific methods of modern agriculture "into Jamaica. At present, whenever a Jamaica proprietor "wishes to improve his cultivation and the method of handling "almost any product, he has to get his agents from abroad, and "yet, in face of this, surprise is expressed that the intelligent "Jamaica youth turns away from agriculture. He has at "present no opportunity of being trained to become valuable, of "being fitted to fill the most useful and best-paid posts, or of "being prepared to meet foreign competition ; his own prospect "is that of being a hewer of wood and a drawer of water, and "seeing all agricultural work which requires scientific training "monopolised by outsiders. This is true now and will become "more so as agriculture improves in other countries. The most "important of all questions for solution in Jamaica is whether "this state of things is to be allowed to continue. If I may apply "one of my American documents to all who would say 'the "'country is poor ; we cannot afford to do it :' I should say 'the "'truth is just the other way ; it has become absolutely necessary "'to our progress ; the truth is we cannot afford not to do it, not

" 'to use every method which the experience of foreign countries
" 'shows to be conducive to improving our agricultural methods
" 'and results; and that experience is unanimous in insisting on
" 'the necessity of Scientific Agricultural Education.' "

438. Before closing this review on the industrial condition of Jamaica, it may be useful to refer to the societies, institutions, and other agencies that have been of service in promoting the prosperity of the island. One of the oldest is the Institute of Jamaica, which, by means of its museum and library, as well as by its lectures and premiums, has stimulated inquiry into a large number of agricultural subjects. It has also put forth a scheme for articled pupils, and brought about a means of communication between planters and pen keepers in Jamaica and intending emigrants from Great Britain and elsewhere. There is published annually a pamphlet, extensively circulated abroad, the last entitled "Jamaica in 1897," giving information concerning the resources of the island and the inducement it offers to settlers. The Institute originated the series of horticultural shows held in Kingston since 1881, and led to the formation of the Jamaica Horticultural Society in 1885.

439. The Royal Jamaica Society of Agriculture and Commerce and Merchants' Exchange was also established in 1885, and, according to the Jamaica Handbook, "it is entitled to be classed "amongst the most useful and valuable institutions of the "island." The Jamaica Agricultural Society, a more recent creation, was started in 1894. This has received very influential and general support, and the President, Sir Henry Blake, takes an active interest in its work. It publishes a monthly "Journal," which promises to be of service in promoting agricultural interests. There are besides a Sugar Planters' Association and a Pen-keepers' Association. The "Handbook of Jamaica," issued regularly since 1881 from the Government Printing Establishment, contains very complete historical, statistical, and general information. This is probably one of the most useful handbooks connected with any of Her Majesty's possessions.*

(Signed) D. MORRIS.

London, 31st July 1897.

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* The London Agent is Edward Stanford, Cockspur Street, S.W.

APPENDIX.

SCHEME FOR THE ESTABLISHMENT OF A DEPARTMENT OF ECONOMIC BOTANY AND FOR AGRICULTURAL INSTRUCTION IN THE WEST INDIES.

At the request of the Chairman the following scheme has been prepared for the special Public Department suggested by the Commission for developing the resources of the Leeward and Windward Islands and Tobago, and for affording assistance to the experimental cane cultivation to be carried on, in continuance of present efforts, in British Guiana, Barbados, and Antigua.

It is understood that concurrently with the working of this scheme steps would be taken by the Government in each island to open roads, to settle the people on the land, and provide facilities for delivering produce at the nearest shipping ports.

It is further understood that a subsidy would be granted by the Imperial Government—(1) to establish direct steam communication (weekly or fortnightly as required) between Dominica and St. Vincent and New York, and (2) for cheap and regular steam communication by means of two or more small steamers between the several members of the Leeward and Windward groups connecting with each other, and with the New York steamers at a central point such as Barbados or St. Lucia.

It would be desirable to arrange for such tariffs by these steamers as would afford facilities for the conveyance of produce at specially low rates of payment, and supply a ready and convenient means of moving from one island to another to all classes of the community.*

The probable amount of the subsidies required would be 5,000*l.* for the service to New York, and 1,800*l.* to 2,500*l.* each for the local steamers; 10,000*l.* should be sufficient for both services.

It may be pointed out that the islands under consideration form an extended chain, the component parts of which are divided by intervals of sea varying from 20 to 100 miles across. They extend, in fact, north and south over seven degrees of latitude and form the eastern boundary of the Caribbean Sea. The extreme points are distant seven days by the route taken at present by the Royal Mail Company's steamers which require a detention of two days and nights at Barbados.

The duties to be entrusted to the proposed Department have been described in the report as follows: (1) to supervise and extend the work of the present Botanic Stations; (2) to start

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* The Royal Mail Company might also be asked to afford special facilities for the conveyance of bulletins, seeds, and economic plants between all parts of the West Indies. Such articles should be carried free of charge when exchanged between the several botanic gardens for the purpose of improving the general welfare of these Colonies.

industrial schools for training boys in agricultural pursuits; (3) to encourage the theoretical (and to some slight extent the practical) teaching of agriculture in elementary schools; (4) to promote the teaching of scientific agriculture in colleges and schools; (5) to organise horticultural shows and exhibitions of implements and machinery suitable for cultivating and curing tropical products; and (6) to prepare bulletins, leaflets, and other literature on subjects suitable for cultivation in the West Indies.

The duties devolving on the Botanic Stations may be more fully described. They are to devote themselves in a systematic manner to the work of introducing, propagating, and distributing all the promising economic plants of the tropics; they are to initiate the experimental cultivation of new or little known plants, and assist in the efforts made in the larger colonies to secure improved varieties of the sugar cane. They are to act as centres for diffusing accurate information, and as training institutions for the practical teaching of tropical agriculture; also as the headquarters from which agricultural instructors would be sent to give lectures and demonstrations bearing upon the selection of land for tropical economic plants, their suitable cultivation, and the best methods for curing and packing the produce.

No provision is made in this scheme for the purchase of land or for buildings required. These might be provided by the local governments in lieu of continuing the present payments to the botanic stations. It is desirable that the funds contributed by the Imperial Government should be wholly devoted to the efficient working of the department, and not to establishing gardens or erecting permanent structures.

Administration.

It is recommended by the Commission that "a competent Imperial officer" be appointed to take charge of the Department, whose duty, briefly stated, would be to develope the agricultural resources of the Windward and Leeward Islands and Barbados.

It has been suggested that this officer should act under the direct authority of the Secretary of State, and should locally administer and be responsible for all the funds contributed by the Imperial Government. The most convenient headquarters in view of the present Mail arrangements would be Barbados.

This scheme might be submitted beforehand, and receive the careful consideration of the several governments concerned, but when the general policy has been settled it should be understood that all administrative details, and the charge of all the existing and any further Botanic Stations established in the Windward and Leeward Islands, are left entirely in the hands of the Imperial officer who might also act, as occasion required, as consulting authority to the other Colonies.

It is an essential part of the scheme now set forth that it should be consistently carried out for a period of 10 years at least.

Head Office.

	£
*Chief Officer	1,000
†Travelling superintendent	400
Clerk	200
Travelling and office expenses	600
Total	2,200

TOBAGO.

The Commissioners state that "it is desirable that a botanic "station be established at Tobago subordinate to the Botanic "Department at Trinidad, and having for its object the attainment "of the same end." The island is too poor to support such a station itself, and it is very improbable that Trinidad, at present at least, will be prepared to assist it. The only alternative is to include it under the present scheme. The supervision might very well be left to the Superintendent of the Trinidad Department. The grant proposed might be expended as follows :—

Botanic Station, Tobago

	£
Curator, 150*l.*–200*l.*	200
Agricultural Instructor, 70*l.*–100*l.*	100
Foreman	50
‡8 labourers, 15*l.*...	120
Tools, manure, &c.	30
	500
‡or 6 labourers, 15*l.*	90
3 students, 10*l.*	30
	620

GRENADA.

The present Botanic Garden, with the limited means at its command, does useful work, but, in accordance with the recommendation of the Commission, "this work should be extended "and the station held responsible for agricultural instruction, for "the introduction and experimental cultivation of tropical plants "of economic importance." Provision is suggested for additional land to be placed under experimental cultivation, for the employment of an agricultural instructor, and for the training of students. The latter are to be boys selected from the elementary schools and given a small weekly sum (in fact, a scholarship) to support

* The Director of the Botanical Department in Jamica receives salary and emoluments of 800*l.* a year : the Government analytical chemist at British Guiana receives 1,000*l.* a year.

† To complete one visit of inspection through all the islands, staying a fortnight in each one, would occupy about four months. It is, therefore, essential to have the services of a superintendent to assist in organising the various agencies, and to be in charge of the head office when the chief officer is on tour.

them while being trained at the Garden. The full course should be for five years. Some assistance might be given from Grenada to the Island of Carriacou as indicated in the report on that island.

The details of the vote are as follows :—

Botanic Station, Grenada.

	£
Curator	200
Agricultural Instructor, 130*l.*–150*l.* ...	150
Travelling and house allowance	70
Foreman	70
10 labourers, 15*l.*	150
4 students, 10*l.*	40
Tools, plants, &c.	50
	730

St. Vincent.

This island and Dominica require not only immediate assistance to prevent the people from becoming absolutely destitute, but they promise to be more readily rescued from the condition by establishing a trade in bananas and other fruit with New York. This subject has been already dealt with in the preceding report. It is proposed to employ two agricultural instructors, to increase the number of students to six, and start in each island an industrial school to train 25 boys in agricultural pursuits. These boys are not to be criminals, but those placed under training by the consent of their parents, or orphans, and destitute children. The estimated cost of the industrial schools proposed in this scheme is based on the working of the successful reformatory schools now existing in Barbados and Antigua. No provision is made for buildings. These may be loaned from the local governments. The total grant of 1,500*l.* is proposed to be expended as follows :—

Botanic Station and Industrial School, St. Vincent.

	£
Curator	200
2 Agricultural instructors, 150*l.*	300
Travelling allowances	80
1 foreman	70
1 foreman	60
12 labourers, 15*l.*	180
6 students, 10*l.*	60
Tools, manure, &c.	50
	1,000
Industrial School...	500
	1,500

St. Lucia.

It is stated in the Commissioners' report that "more suitable "land for the purpose of experimental cultivation in connection "with the botanic station is very much required." The Local Government might assist in providing the land and the necessary buildings. St. Lucia offers an excellent field for the development of minor industries. Everything hitherto has been stopped by want of means. The grant proposed may be applied as follows :—

Botanic Station and Industrial School, St. Lucia.

	£
Curator	200
Agricultural instructor, 130*l.* to 150*l.*	150
Travelling and house allowance	70
Foreman	70
10 labourers, 15*l.*...	150
4 students...	40
Tools, plants, &c....	50
	730
Industrial School...	500
	1,230

Barbados.

Provision is suggested for maintaining two experimental stations for sugar cane cultivation at Barbados, one at Dodds, and the other on the highlands in the ratooning districts of the island. The complete dependence of this colony on sugar renders it necessary to devote special attention to the raising of new canes and in improving their saccharine contents. The officers in charge of the present experiments, or others selected for the purpose, should give their whole time to the work, regularly visit the estates, and publish information at frequent intervals. The detailed working of these stations might be arranged after consultation with the Government of Barbados. The contribution of 20*l.* per annum hitherto made by the botanic station at Barbados to the Jamaica Gardens would cease under the working of this scheme.

Botanic Station and Experimental Cane Cultivation at Barbados, 1,500*l.*

Dominica.

Remarks on this vote have already been given under St. Vincent. The details are here repeated.

Botanic Station and Industrial School at Dominica.

	£
Curator	200
2 agricultural instructors, 150*l.*	300
Travelling allowance	80
1 foreman	70
1 foreman	60
12 labourers, 15*l.*	180
6 students, 10*l.*	60
Tools, manure, &c.	50
	1,000
Industrial School...	500
	1,500

Montserrat.

The station established in this island in 1890 was abandoned for want of funds to carry it on. An agricultural instructor is much needed to visit and encourage the peasants (in case shipping facilities are provided) in the cultivation of fruit and other products for export. For training boys in agriculture, arrangements might be made with Antigua. This vote is arranged on the same lines as that for Tobago, where the circumstances are very similar.

Botanic Station at Montserrat.

	£
Curator, 150*l.*–200*l.*	200
Agricultural instructor, 70*l.*–100*l.*	100
Foreman	50
*8 labourers, 15*l.*	120
Tools, manure, &c.	30
	500
*Or 6 labourers	90
3 students	30

Antigua.

The chief and practically only interest in this island is sugar. Hence it is proposed to provide for systematic experiments in raising new varieties of cane, and in improving the cultivation by the use of manures and other means, as in Barbados and British Guiana. The Botanic Station should co-operate in this work, and also endeavour to improve the pine-apple and any other minor industry that offers hope of success. There is already a good industrial school at Antigua which should be maintained on its present lines.

Botanic Station and Sugar Cane Experiments at Antigua.

	£
Botanic station	450
Sugar cane experiments...	550
	1,000

ST. KITTS-NEVIS.

The same organization is suggested in St. Kitts-Nevis as in Antigua, with the addition of an industrial school and an agricultural instructor. The latter should devote special attention to the peasant proprietors at Nevis.

St. Kitts-Nevis.

	£
Curator, 150*l.*-200*l.*	200
Agricultural instructor	70
6 labourers, 15*l.*	90
3 students 10*l.*	30
Manure, tools, &c.	50
	440
Sugar cane experiments	300
Industrial school	500
	1,240

SUMMARY.

Botanic Stations and Industrial Schools.

	£
Tobago	500
Grenada	730
St. Vincent	1,500
St. Lucia	1,230
Barbados	1,500
Dominica	1,500
Montserrat	500
Antigua	1,000
St. Kitts-Nevis	1,240
	9,700

BRITISH GUIANA.

The important character of the investigations carried on by Messrs. Harrison and Jenman in raising and testing new varieties of canes has already been noticed. There is such good promise of success that it would be a calamity if these experiments are not continued on the present lines. It is suggested to make a special provision for these investigations and to leave the detailed arrangements to be settled after consultation with the Government of British Guiana.

Sugar cane experiments in British Guiana ... 1000*l.*

Horticultural Shows.

These shows are suggested as effective means of bringing into notice the resources of the islands and of creating an intelligent interest in improving the cultivation of the soil and in prosecuting new industries. The funds set apart for this purpose would be chiefly spent in bringing together implements of field and garden husbandry, in explaining the construction and mode of working of suitable machinery for cleaning and curing produce and in exhibiting samples of produce skilfully selected and packed for export purposes. One or two shows might be held annually in each island co-operating with any local efforts made in the same direction.

Grant ... ... 500*l.*

Grants to Elementary Schools.

Following the example set by the Education Department in Jamaica, it is proposed to make small grants in aid in two classes (A) to schools in which the theory of agriculture is satisfactorily taught, and (B) a slightly increased grant in cases where in addition to the teaching of the theory of agriculture school gardens or experimental plots are maintained by the efforts of the teachers and scholars. The amount of the grant proposed for each school in Class A would be from 1*l.* to 3*l.*; in Class B from 2*l.* to 5*l.*, depending in each case on the number of children who reach a satisfactory standard of attainments. For the first year or two the total amount of these grants would necessarily be very small as the chief outlay would consist of expenses incurred in giving instruction to and in training the teachers.

Grants ... ... 500*l.*

Bulletins, Leaflets, &c.

Bulletins, such as are now issued by the Botanical Institutions in the West Indies, are regarded as indispensable means for reaching the more intelligent members of the community and of diffusing amongst them accurate information in regard to tropical products. The leaflets, proposed in addition, would be distributed amongst the labouring classes after lectures and demonstrations by the agricultural instructors, and copies would be supplied free to magistrates, medical and government officers, clergy, police officers, and all persons having influence with or coming into contact with the peasantry. The leaflets would contain hints, expressed in simple and clear language, on the treatment of the soil and plants, and worded so as to be used for dictation lessons in the higher classes in elementary schools. Readers would be prepared for use in elementary and industrial schools dealing with the familiar plants of the tropics.

Grant ... ... 500*l.*

Grants to Colleges and Schools.

There are no institutions existing at present in any part of the West Indies where the scientific teaching of Agriculture is carried on. All the better class of students attending the higher schools turn their attention either to the learned professions or to Government clerkships, while the better paid appointments connected with agriculture are filled from outside or by a small number of

local men who by hard plodding and the slow teaching of practical experience have qualified themselves to undertake charge of plantations. These local men are useful but they have had no scientific training, and necessarily, from their position, are restricted not only in their capability of realising the progress made in other countries, but of adapting such progress to their own circumstances. Unless brought up on family estates, agriculture is seldom regarded as a suitable career by young men in the West Indies ; in fact they avoid it as much as possible, and their example is unfortunately followed by the better class of peasant proprietors, who prefer to educate their children for positions as clerks or as assistants in stores to any work connected with agriculture. A long period must elapse before there is a considerable change in this respect, but in certain Colonies such as Barbados, Jamaica, Trinidad, and British Guiana, where there exist colleges and schools of high standing, it is very desirable to make provision for the higher agricultural education necessary to instruct those who may afterwards become managers and proprietors of estates, and fit them for availing themselves of the results of modern advances in improving local agriculture. The teaching and training given in temperate countries are of little service to men who are destined for tropical planting. Such men must be trained amidst the special circumstances of the tropics.

Grants might be offered for sound agricultural teaching to the Codrington College at Barbados, the Queen's Colleges at Trinidad and British Guiana, and to the Jamaica High School. The amount of the grant paid in each case would depend on the number of pupils who show ability to pass a written and oral examination, and on the character of the provision made for laboratory teaching and field work. Some assistance in this direction might be rendered by the officers and establishments connected with the Department, but special teachers, one at each college, would be necessary, at salaries from 350*l* to 500*l*. per annum.

Grants ... ... 2,600*l*.

Summary.

Botanic Department.

	£
Head office	2,200
Nine botanic stations and four industrial schools	9,700
Sugar cane experiments at British Guiana ...	1,000
Horticultural shows, exhibition of implements, &c.	500
Printing bulletins, leaflets, and distribution	500
Grants to elementary schools for teaching the theory of agriculture and care of school gardens...	500
Grants to colleges and schools for teaching scientific agriculture	2,600
	17,000

To this might be added the subsidies, estimated at 10,000*l*., for steamer services, making a total of 27,000*l*.

D. M.